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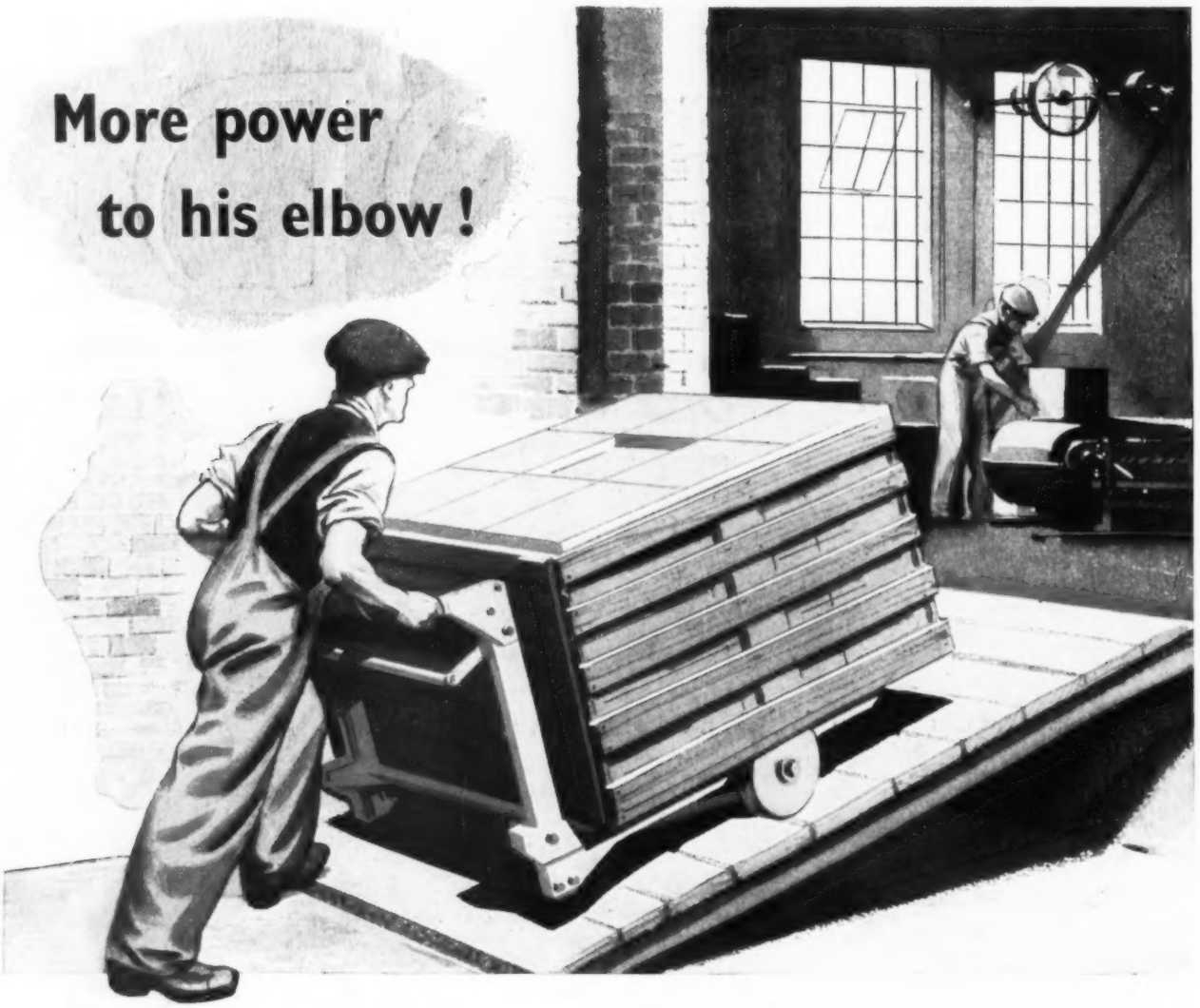

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FOOD MANUFACTURE

Incorporating Canning, Packing and Preserving.

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The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

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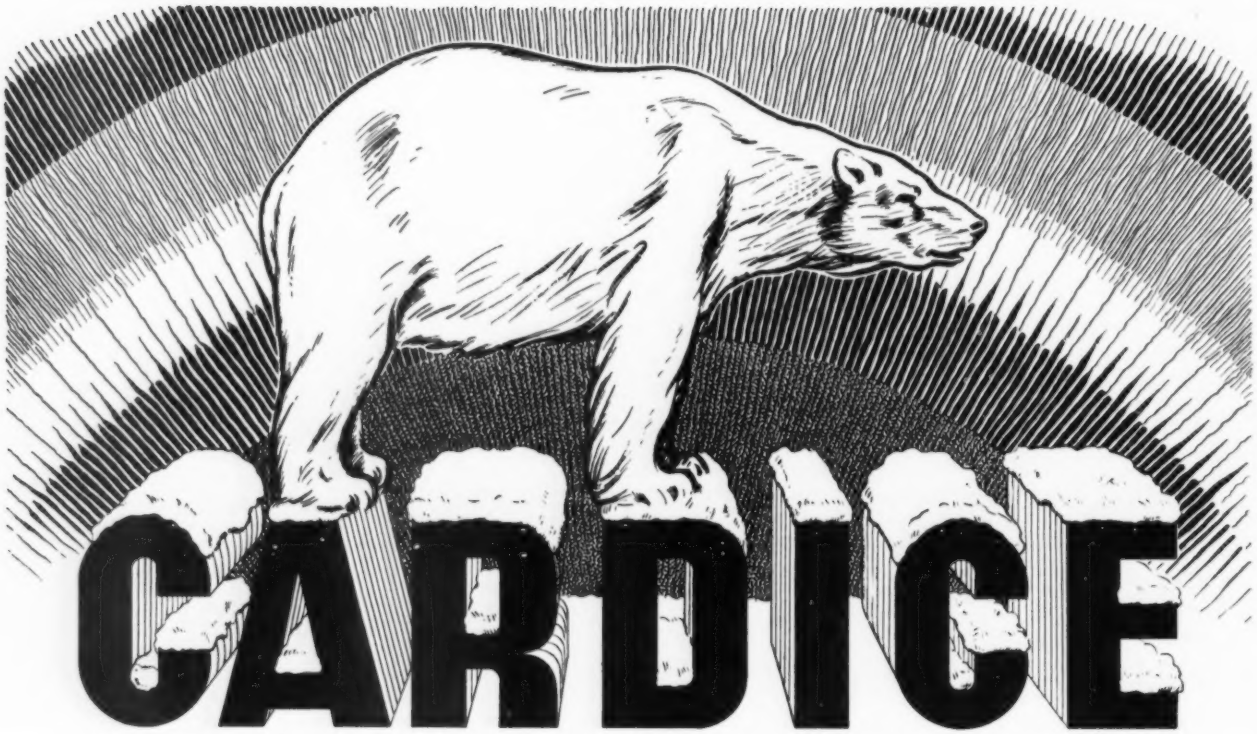

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FOOD MANUFACTURE

Vol. XIII, No. 12 December, 1938

Christmas is Coming

WHEN THESE words are being read the festive season will still be three weeks ahead, but this being the last opportunity before December 25 of extending to our readers the time-honoured wishes, we say :

A Merry Christmas to Everybody

At this season the food industry comes into its own. If high-pressure food salesmen ever visualise a Golden Age, it is surely an era of perpetual Christmas, in which creatures bearing a Pickwickian air of eupeptic opulence have their being.

The ultimate bounds beyond which the food industry cannot expand are set by the capacity of the human stomach, but at this season that capacity reveals an amazing elasticity. Over a million birds pass through Smithfield in December —more than two and a half times a quiet month, and representing something like three-quarters of a million pounds sterling. Forty thousand extra tons of oranges are sold at Covent Garden, and incredible quantities of dried fruit and chocolates pass through the provision shops.

For the rest of the year prudence must be observed, whether dictated by the resumption of economic principles or merely *embonpoint* or other reasons. Psychologically it is probably a good thing to cast inhibitions overboard for the nonce and to say :

> Better " a morning after "
> Than never " a night before."

It's a poor heart that never rejoices.

Canning Convention

In these strenuous times the happenings of a month ago are comparatively ancient history. There is little to be added to what has already been said about the Bristol functions. It was voted by most people to have been, as our contemporary *Food Industries Weekly* put it, " a roaring success, socially ".

It would be churlish not to add our own word of praise for and appreciation of the energy of all those well-known figures concerned with the organisation of the Convention, and without being invidious a special compliment must be accorded to Mr. Packer, upon whom much responsibility for detail rested, but whose brow was unclouded thereby.

Nor can we ignore the contribution to Bristol's success made by those responsible for several unofficial functions—the golf meeting, Mr. Leonard Hill's dinner, and the Canning and Food Industries' luncheon. At the dinner and luncheon it would not have been possible for a more representative gathering of all those who matter in an industry to have assembled. These functions " broke the ice " and produced that friendly atmosphere which in the ordinary way takes time to establish.

The Convention ball did not hang fire for a single moment, and certainly demonstrated the faculty of not only the youths but many of the veterans of the canning industry to step a pretty measure. Where the latter learned neoteric steps like the Lambeth Walk and the Palais Glide is somewhat of a mystery !

Turning to more serious matters, opinions were not quite so eulogistic about the conferences. Although Sir Edgar Jones declared that the National Canning Council had called the bluff of the critics by allotting two days for discussion, there was a woeful paucity of things discussed, and it took all Sir Edgar's notable persuasiveness to start the ball rolling.

We heard a lot of opinions about fruit salad. One or two other subjects were touched upon, such as the ideal can-opener—to be perfectly frank, not extremely stimulating.

Would it not be possible to arrange for, say, half a dozen experts to read short papers on the problems of the preceding year and how they have been tackled ? A paper, for example, on " hydrogen swells " would have been interesting. Surely quite a lot of work must have been done on this subject during the past year ? Among half a dozen papers various angles of the industry—scientific, commercial, and industrial—could be discussed. The reading of papers on specific subjects,

especially if they were announced well beforehand, would give those attending the conferences something to bite on.

To any contention that it would be futile to bring half a dozen learned experts to read papers to such an attenuated gathering as was seen on the second day at Bristol the reply is that such contention would be an admission of the hopelessness of achieving anything useful or durable by meeting at all—an opinion which we are sure is not held by anyone in authority, and certainly not by us.

Three Farmers' Bills

The King's Speech on the opening of the present sitting of Parliament promised three measures for farmers. They will deal with three sections of agriculture which have been the subject of much discussion in the last ten years or so—milk, wheat, and poultry.

The Milk Bill presumably is intended to implement the proposals contained in the White Paper on milk policy issued in July, 1937. These dealt with a price insurance plan, premiums for a graded milk (these, by the way, are already in operation), a Milk Commission, cheap milk for school children and nursing mothers, and proposals for reorganising distribution. There will undoubtedly be very determined opposition to the Bill in several directions, notably the appointment of a Milk Commission and also the problem of distribution.

The Wheat Act has been found necessary because of the shortcomings of the Act of 1932 in certain directions. The principle is to provide for a periodical review of the standard price of wheat and also to enforce firmer definitions of flour and offal.

The Act of 1932 was not sufficiently definite to prevent flour and semolina being imported as offal, and a case in which the Commission sued a firm of importers went to the House of Lords and was decided against the Commission. The new Act is framed so as to prevent a recurrence of this. It is difficult to forecast the lines on which a Poultry Bill will be framed. There is much dissension among poultry farmers and much opposition to any form of compulsory marketing scheme, and it is difficult to see how any other way of dealing with the problem can be devised.

Wheat Act and Poultry

One of the objects of the new Wheat Act to be brought before Parliament during this session is to enforce analytical standards to define exactly what constitutes wheat offals, and it is proposed to introduce a sliding scale from flour, which pays the full quota, to offal, which pays no quota. The sliding scale is based on ash content and moves in quota divisions of one-eighth. Thus a meal with an ash content of less than 2·0 per cent. is classed as flour and pays full quota, one with an ash of 2·0 per cent. to 2·1 per cent. pays seven-eighths, 2·1 to 2·2 per cent. six-eighths, and so on until a meal with over 2·7 per cent. becomes free of quota.

When the quota is high, as it is at present, it is a matter of great concern to poultry keepers and other users of wheat offals, to see that they do not become liable to quota payments by inadvertently purchasing offals which fall into the 2·0 to 2·7 per cent. ash category.

At a recent meeting of the National Poultry Council the question was discussed in relation to poultry, and it transpired that the Minister has decided not to make any change in the principle of the present Act, whereby wheat milled and delivered by the miller for consumption without further manufacture as animal or poultry feeding-stuff is exempt from quota liability. He has, however, decided to accept the Wheat Commission's proposals for an analytical definition of flour and offal based on ash tests. The National Poultry Council oppose this and propose active action when the Bill comes before Parliament.

The Council feels that if there is to be an ash standard a lower limit should be fixed for nutritive value required by the poultry keeper to enable him to check mortality and to increase production.

Thatcher Wheat

One of the troubles of the Canadian wheat grower has been the scourge of wheat stem rust, and much research has been devoted to the production of rust-resistant varieties. Thatcher wheat is a rust-resisting wheat originally grown in the United States, and it has now been grown satisfactorily in Canada.

Extensive tests conducted over a number of years in Canada, the United States, and finally commercial milling and baking tests in Great Britain this year, have shown that Thatcher compares favourably with Marquis and other varieties eligible for the highest Manitoba grades.

The Board of Grain Commissioners has included Thatcher in the list of varieties eligible for the highest grades, and, in view of the extensive seeding of this variety this year, it is anticipated that appreciable quantities will appear in export shipments of the forthcoming crop. It is a cross-bred

wheat developed at the Agricultural Experimental Station, Minnesota, its parents being Marquis X Iumillo and Marquis X Kanred. It ripens two or three days earlier than Marquis, is equal to it in straw strength, and usually yields better, even under non-rust conditions. Moderately resistant to stem rust, it is more resistant to root rot than Marquis, but it is very susceptible to leaf rust and bunt or stinking smut. The introduction of this wheat into Canadian cultivation marks a step forward in that important wheat country.

Molecular Distillation

We made mention in our last issue of the researches into the causes of night blindness, which is now generally recognised to be due partly, or entirely, to a lack of vitamin A in diet. Any means, therefore, of augmenting the available supplies of the vitamin for general use is of great importance, and the recent paper at the joint meeting of the Society of Chemical Industry Chemical Engineering Group and the London Section is of considerable interest.

The paper by Tewell, Mead, and Phipps gave details of the work done at the British Drug Houses in conjunction with Carr during the last eight years. The process described, by which supplies of vitamin A can be obtained from otherwise waste products, utilises the recently discovered phenomenon known as "molecular distillation," previously only possible on the laboratory scale. This form of distillation overcomes the difficulty of concentration by boiling, which, even under greatly reduced pressures, largely destroys the vitamins.

In the new process the vitamins, instead of being boiled off from the original oils, are evaporated more slowly at low temperatures. This process removes the dependence on cod and halibut for vitamin A. The livers of most sea fish can be utilised, and, in addition, a much purer substance is obtained. With such increased supplies readily available from infancy onwards, the national health should show an improving tendency.

Bakery Research

In our September issue we published an article and several letters on the question of a national research scheme for the baking industry. It is interesting to note that the Education Committee of the National Association of Master Bakers, Confectioners, and Bakers has recently passed a resolution that "the institution of a research scheme for the bread-baking and flour confectionery industry be proceeded with immediately". This subject has been one for discussion for a number of years, but there has never been such unanimity of opinion in favour of any scheme as was accorded this resolution.

We feel certain that the baking and confectionery industries would undoubtedly derive benefit directly or indirectly by the institution of a research scheme, but there are many sides to every question, and this particular one has its fair share.

One of the great difficulties confronting the sponsors of the scheme is the task of showing to the bakers how they will get a cash value, either immediate or in the reasonably near future, from the research association, if one is set up. To begin with, while more important lines of research were being followed up, a bakery research association could undoubtedly provide immediate assistance to many members by giving advice on raw materials, how and where to obtain them, and how and when to use them.

Once confidence had been established and suspicions allayed, the research association would be able to turn its attention to pure research problems, but until that time matters would be a little difficult.

The Pig Contracts

We publish, in another part of this issue, letters from two correspondents on the pig problem. Our correspondents do not take such a gloomy view of the state of the bacon curing industry as we expressed in a recent issue. We sincerely hope they are right and that there is a brighter prospect in front of our pig breeders and bacon curers. Time will show, and, in the meantime, the response to the contracts seems sufficiently satisfactory to give the bacon pig contract a fair trial.

When all queries are settled and when the final additions are completed it is likely that the number of contract pigs will touch the million and a half figure. This is a big figure if one bears in mind the decrease in pig breeding during the last year or so. Over three hundred thousand have been contracted for on open offer, and this should be a great help in the vexed question of equitable distribution. The maximum number of pigs eligible for the direct benefits of the scheme for this contract was 2,100,000 at the discretion of the Bacon Development Board. The present response, although regarded by some authorities as satisfactory, thus falls short of the possible maximum by 600,000, and there is plenty of room for development.

There may be many embryonic flies in the ointment to cause trouble later on. Some people think that in the absence of bonuses the distribution will not be level enough from month to month. We believe, however, that the next twelve months will show the strength and weakness of the scheme, and it behoves all concerned to give it every chance.

Science in Advertising

Among references to modern advertising and its tendencies which have appeared in recent issues of the *British Medical Journal* is one which declares that "medical men must view with some alarm the possibility of the profession being used in an advertising campaign". The writer also states that the whole country must by now be familiar with drawings of medical men wisely diagnosing the patient's complaint from a wife's anxious description and prescribing the advertiser's product. A list is given of nine examples of goods advertised with "medical catchwords, diagrams, or semi-scientific statements".

We gather that exception is taken, for example, to the calorie value of breakfast foods being given; but surely this is all to the good, in that it makes the man-in-the-street more calorie-conscious. The medical profession throws out enough warnings against overfeeding now that dietetics are the fashion and vitamins have lost their air of mysticism.

An advertiser of soap makes mention of 27 germ diseases which may be transmitted by dirty hands. (A veritable stroke of genius that "27"!) The age-long juxtaposition of a higher attribute with cleanliness must suggest that any means of eliminating dirty hands might be counted for righteousness, even if those means consist of using germs as bogies.

Apart from these considerations, we cannot help feeling that one of the things these advertisements really are doing is to boost the medical profession. Millions of people daily see pictures of an anxious and obsequious patient looking appealingly at a noble and intellectual-looking doctor and listening to his advice.

The reader may have found that the beverage advertised has not produced that much-sought-after euphoria which leads the ambitious clerk to the managing director's chair. Surely the suggestion is that a visit to the doctor will bring forth the real secret.

On the whole, we feel that the medical profession should be grateful and not disgruntled at the trend of modern advertising, *quasi*-scientific though it may be.

Dirty Hands

Apropos of hand washing, Dr. W. M. Scott, of the Ministry of Health, has called attention to the commonness of bacillary dysentery in this country, and he suggests that this is an index of defective sanitation and an indication of the faultiness of precautions to prevent transfer of bowel infection from person to person. Dr. Scott points out that lack of personal hygiene enables the infection to be conveyed by the hands of an infected person to others.

He makes some practical suggestions, such as, in connection with water-closets, "a tap, with soap and towels, preferably of paper, should be as much a fixture of the water-closet as the roll of toilet paper." Happily, in establishments handling foods, proper washing facilities and their use will be made generally imperative when the new Food and Drugs Act comes into force.

Some psychologists declare that the procedure of the restaurant diner who furtively wipes his spoon on the tablecloth is a vestige of the savage's fear of a shadow of a passer-by falling on his food, and is in its last analysis a manifestation of that fear. We would rather regard it as a result of some wholesome, albeit empirical, notions of modern bacteriology. We hear a lot about the use of fear in making people buy things, but if only by frightening can people who handle our food be made to observe the most elementary habits of cleanliness, then we are inclined to favour the use of a little terrorism.

Education in Diet

A suggestion, the interest of which lies in the possibilities of biological education in helping to solve the diet problems of the nation, is put forward by Mr. R. Weatherall, of Eton College, in *The Times* of November 7. With reference to the development of any campaign to advertise home-grown food he deplores a movement which would throw the national food supply open to competitive publicity, since it would attempt to establish rival claims to fixed family incomes. In deprecating a "background educational campaign" which would serve as handmaiden to a scheme of commercialised publicity, he considers that it would be better to work through the existing organisations of schools and colleges, and avers that those who teach biology in particular are ready to play their part in making Britain a healthier, stronger, and saner nation.

("*Industry's Achievement*," by Noel Griggs, F.R.P.S. Courtesy Studio Briggs, Ltd., *Exhibition of Photography in Commerce and Industry*, 1938.)

The author, H. C. Appleby, has been engaged on Fuel Economy problems in different parts of the world since 1908. His suggestions will appeal to all food manufacturers who are interested in their coal bills.

FUEL ECONOMY IN THE FOOD INDUSTRY

THE MOST careful investigators of the latest and most satisfactory methods of burning fuel to evaporate water into steam at a specified pressure and temperature are the people running the super-power stations that are linked up in the National Grid supplying electricity over huge areas of Great Britain. For them, fuel cost is the largest single item of their running costs and they have, since their inception, incessantly kept a watchful eye on that ever-present consideration— "cost of coal per unit of electricity generated". In order to keep this at its lowest point and, if possible, further to reduce it, constant attention is given to improvements of methods of burning coal: (1) with existing plant, (2) improving such plant to get greater efficiency, or (3) introducing new types of plant.

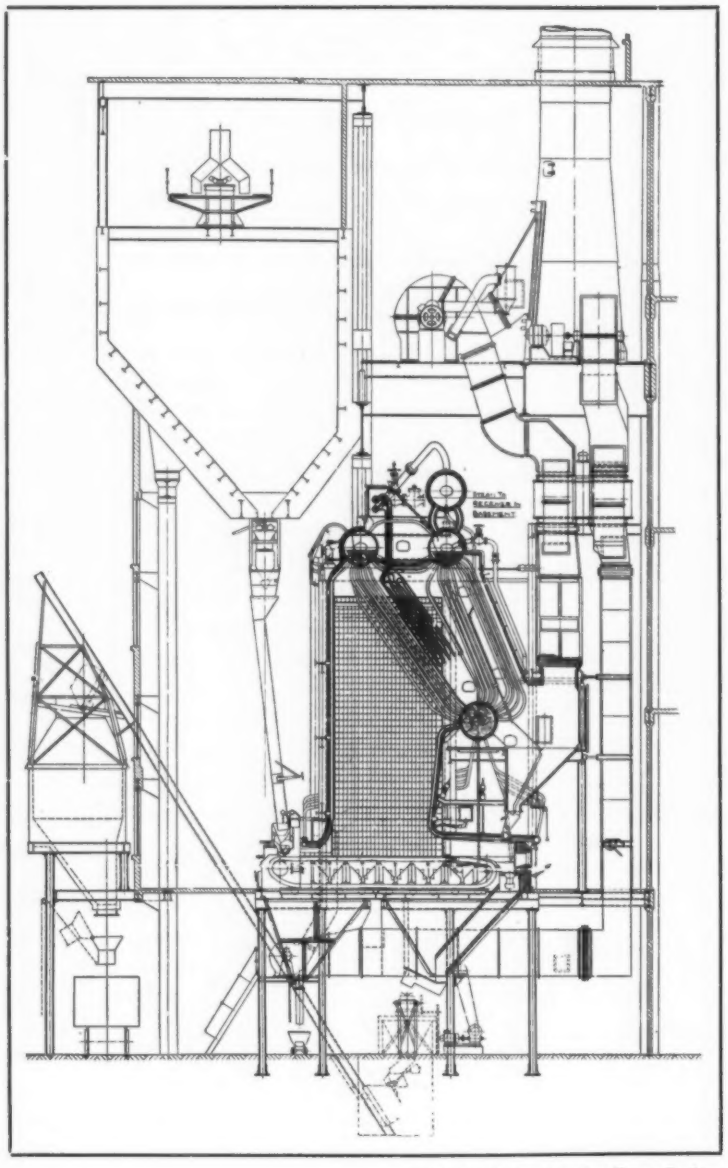
Coal Prices

The increase of coal prices during the past three years has further stimulated economy investigation. The annual reports of many of the electricity undertakings for the current year show a rise in coal costs, compared with three years ago, of from 25 to 40 per cent. As an example, whereas the Birkenhead undertaking was paying 14s. 9d. per ton in 1935, the price was £1 per ton in 1938.

If, then, expert engineers are seriously preoccupied with increasing coal prices for utility undertakings which have no competition to face, how much more is the need for factory executives—who have to meet competition not only in British but in the world's markets—to set their house in order?

With due acknowledgment to the many factory owners and those concerned with the burning of their fuel who keep economy constantly in mind, there exists, in the author's experience, both at home and abroad a considerable number showing a curious reluctance to conduct enquiries which might lead to a very substantial reduction in fuel cost per recognised unit of output.

The onus is usually placed on the overworked and harassed works engineer, who usually has his work so cut out in seeing to repairs to and maintenance of exist-



[*Engineering and Boiler House Review.*

The vertical section of one of the Stirling 125,000 lb./hr. water tube units at the Plaistow refinery of Tate and Lyle, Ltd.

ing plant and the installation of new items that so far as the boiler-house is concerned he only has time to look in occasionally to see that "steam is all right", or perhaps more often is forced to go there owing to frantic demands from the foremen of the processing departments for "more steam"!

Economies Possible

In many factories there is money to be saved in both the boiler-house and on the processing plant by the introduction of new plant, or by improving the existing plant, and, in many cases, comparatively small expenditure on material together with expert guidance will produce very satisfactory dividends in the form of reductions in the fuel bill. There are, it is only fair to say, certain groups of factories in Britain who have, to the writer's knowledge, engaged on their permanent staff a specialist, together with his assistants (in one case a well-known textile group has done this for over 30 years and, as they are still doing so, they are evidently satisfied that it is a sound investment), whose sole duties are to see that the most suitable coal is purchased; that it is burnt efficiently; and that the water it evaporates into steam is, as steam, utilised efficiently in the processing plant. In many cases coal bills have been reduced by 10 to 25 per cent. for a given output, and in some cases even more.

The Greatest Improvement

The greatest improvement during the last decade in factories where steam is used for processing (the system has been known for many years, but for some unknown reason has not been generally taken up, although it is in many cases a definite money saver) is in the factory where steam is also required for providing power-drives either through indirect "drives" or direct drives by electric motors. It may be said that the saving effected by this system is usually equivalent to the cost of power supply, for the various "drives" through the factory, so that if power costs are known, an approximate figure of the possible savings in hard cash by adopting this system may be ascertained. Although considerable capital outlay will be required to install plant to work on these lines, there will yet remain a handsome profit on the change-over. The above statement applies to factories where at the present time high-pressure boilers are used solely for providing steam for driving main engines, together with auxiliary engines and pumps operating in different parts of the factory, as well as low-pressure boilers to provide steam exclusively for processing.

Conditions in Food Factories

These conditions apply in the majority of food factories, and the main suggestion that is being put forward in this article is the consideration of utilising high-pressure steam, the pressure being sufficiently high to drive an engine or turbine which will supply all power demands. The steam after having passed through the prime mover should not be sent, as at present, to a condenser (to be brought back to hot water), but should be sent on to do heating in the processing departments, thus cutting out a portion of the low-pressure boiler plant now in use for that purpose.

Back-Pressure Turbine

In order to understand the advantage that will accrue from an economical point of view of employing, say, a back-pressure turbine, it is necessary to appreciate the fact that of the total heat energy of the steam which is usefully employed in the heating system, only a small portion could be transferred into work in the turbine, while the greater portions, if not given to the heating system, would definitely be lost in the condenser. The following example will make this clear:

Suppose that 40,000 lbs. of dry saturated steam at a pressure of 20 lbs. per square inch above atmosphere are required per hour for heating purposes, and that there is

also a demand for 1,000 kw. of electric power. To satisfy these demands independently of each other would require a 1,000 kw. high-pressure condensing turbo-generator, taking about 15,000 lbs. of high-pressure steam per hour (this would vary according to the steam pressure, superheat, and vacuum), in addition to the supply of 40,000 lbs. per hour of low-pressure steam at 20 lbs. pressure, which could either be generated in a low-pressure boiler or obtained from the same boiler as supplies the turbine and be reduced through a reducing valve. In the latter case, about 37,000 lbs. of reduced high-pressure steam would be sufficient to meet the demand for 40,000 lbs. of saturated low-pressure steam; and the total consumption of high-pressure steam would then be 52,000 lbs. per hour.

By employing a back-pressure turbine (or engine) about 43,000 lbs. per hour of high-pressure steam would be enough for both services, this steam being first employed in a back-pressure turbine and exhausted from it at a pressure of 20 lbs. above atmosphere to the heating system. The economy effected by this arrangement is obvious.

In this example, allowance has been made for the wetness of the low-pressure steam transferred from the back-pressure turbine to the heating system, and also for the increased rotation losses of a back-pressure turbine as compared with a condensing turbine.

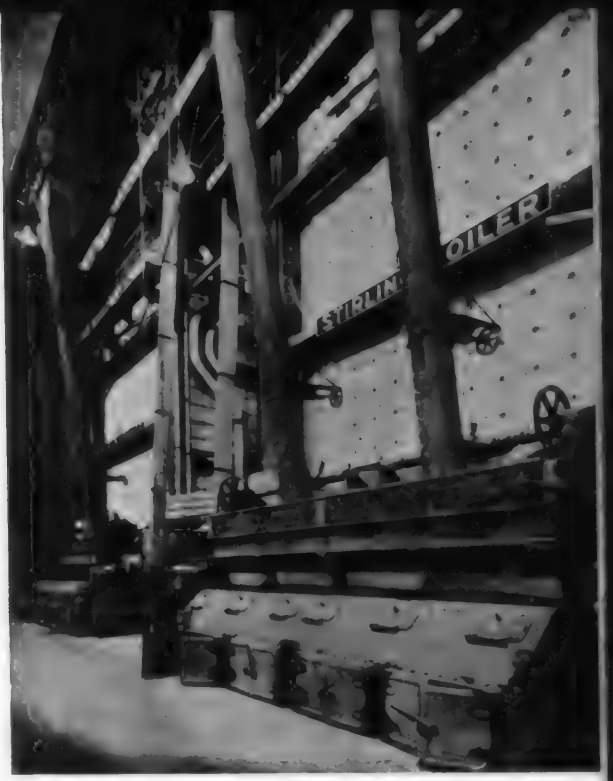
Reduced Heating Costs

It therefore follows that by raising steam to a higher pressure and passing it through an engine or turbine, and so allowing the prime mover to act as a reducing valve, power may be obtained at a very small additional fuel cost compared with that for heating only. Actually, in some cases less fuel is required for combined power and heating than under the arrangement where a straight condensing engine or turbine is used.

On this economical system of working the heating system or process takes the place of the condensing plant usually associated with steam power, but with this important difference—the heat in the exhaust steam, which usually amounts to no less than 60 per cent. of the heat in the coal, is usefully employed, whereas in a power station operating on ordinary lines not only is most of the heat wasted, but in addition there is costly pumping and cooling plant to be installed, operated and maintained in order to dissipate it into the atmosphere.

As a result, the heat efficiency of the most efficient super-power station is only about 25 per cent., whereas *any* small plant working on the combined power and heating principle may easily attain a thermal efficiency of 50 to 60 per cent. Put in another way, *in the best condensing station only about one-fourth of the heat in the fuel is utilised, and in the combined power and heating plant more than one-half.*

Experience has shown that, where electrical power is purchased from outside the factory, substantial savings are possible by adopting this system. For instance, at one brewery using reciprocating engines under this arrangement, the electrical costs are stated to be 0·69d. per unit, while at a sugar factory the costs do not exceed 0·4d. per unit. These figures take into account all items, including a substantial figure for interest and depreciation and capital charges.



[*Engineering and Boiler House Review.*

A Stirling boiler installation.

Speaking generally, provided that the steam exhausted is utilised and not wasted, the system is inherently most economical, and the cost of power is represented practically by the capital charges on the plant necessary—*i.e.*, the engine, generator, switchboard, and pipework and cables in the engine room.

It may be of interest at this point to give particulars of authentic cases of saving effected by using this system. The figures were supplied by the factory officials in each individual case.

Some Examples

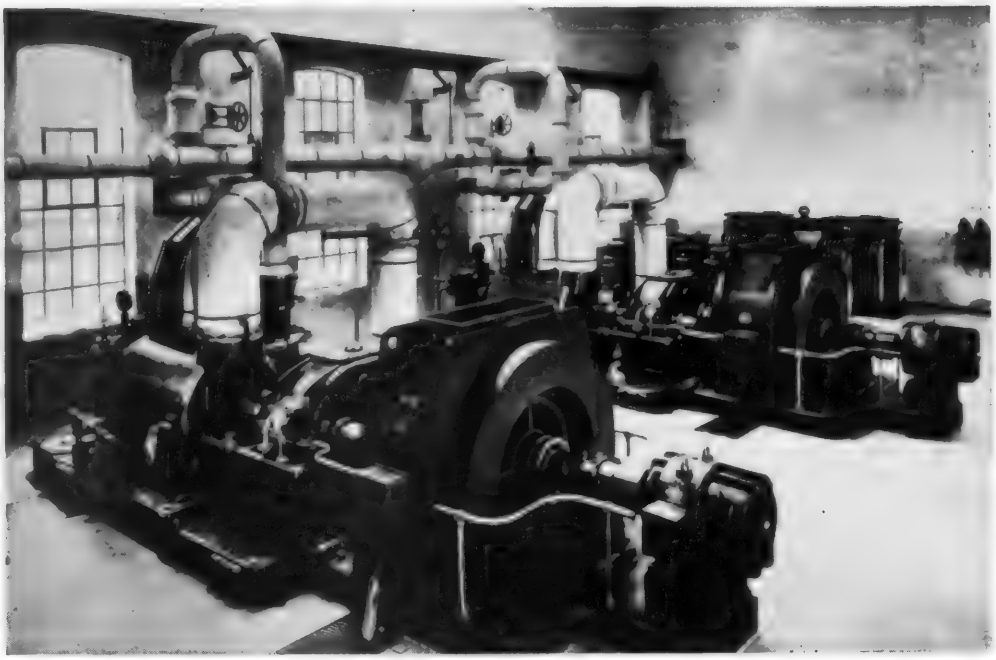
Ex. 1. "The new plant has reduced the coal consumption from 115 to 40 tons per week, a saving of 75 tons a week or 3,900 tons per annum, worth £4,500. This great saving is the result of a thorough reorganisation, including utilising the exhaust steam instead of condensing it."

At this particular factory they had six boilers in use, but now have only two.

Ex. 2. In this instance a steam turbine exhausting at 10 lbs. was installed, and the owners state "the savings by the installation of this plant amount to £100 per week, say, £5,000 per annum".

Ex. 3. As a result of a capital expenditure of £14,309 for a new boiler and a steam-driven passout air compressor at a glass works, it was found that after allowing for interest, depreciation, maintenance and all running charges, an annual saving of £5,319 is effected, which will defray the capital outlay in two and three-quarter years.

Where large amounts of steam are required it is sometimes preferable to use a back-pressure turbine rather than a reciprocating engine, and usually a high-pressure water-tube boiler is also installed to supply the steam.



Right : A Belliss and Morcom engine driving a J. and E. Hall refrigerating compressor at a dairy. The exhaust steam is used for process work.

Left : Two Belliss and Morcom 100 kw. pass-out turbo alternators sets.

A New Food Factory

One new food factory near London has quite recently extended their works, and the plant introduced in their up-to-date steam-using plant includes two 4,500 kw. turbines exhausting at 70 lbs. pressure per square inch. In this case, water-tube boilers have been put into commission to provide steam for the turbines. It is of interest to note that these boilers have a gross efficiency of 86 per cent. at normal load of 84,000 lbs. per hour, and 84·5 per cent. at maximum continuous rating of 125,000 lbs. per hour.

The two turbines are of the impulse type running at 3,000 revolutions per minute, designed for steam at 650 lbs. pressure and a total temperature of 650° to 700° F. A further interesting feature is that the back-pressure is unusually high, being 70 lbs. per square inch (gauge), at which the turbines are designed to exhaust for processing.

Common Faults

Having referred at considerable length to where the greatest possible saving can be secured, so far as plant is concerned in the economical use of fuel, the author would point out a few of the common faults which exist in many factories, in which may be some of those producing food. These can only be very briefly dealt with in this article; indeed, many articles would be required to do justice to the topic "Fuel Economy", as there are so many directions in which fuel can be saved. Not least amongst them is the loss of heat from boiling tanks, pipeworks and other heat-carrying vessels. The following is a simple instance—a tri-drum water-tube boiler operating under the following conditions :

Heating surface, 8,166 sq. ft.
Steam pressure (gauge), 236 lbs. per sq. in.
Superheated steam temperature, 661° F.
Boiler efficiency, 84·3 per cent.
Coal burnt per hour, 7,450 lbs.
Type of coal, slack.
Calorific value (dry), 11,080 B.Th.U. per lb.
Cost of coal per ton, £1.

When completely insulated the total insulated area is 1,391 sq. feet. This includes drums, boiler pipes, valves and super-heater.

The heat leakage from uncovered surface equals 4,500,000 B.Th.U. per hour.

Heat leakage when insulated equals 179,000 B.Th.U. per hour.

Heat saved by insulation equals 4,321,000 B.Th.U. per hour.

Thus, the equivalent saving of coal per annum (of 350 days of 24 hours) would be 1,460 tons.

Pipe Surface Losses

Further to illustrate the enormous loss of heat through lack of covering of a suitable type, in this case referring to pipes, the figures given below will be helpful :

Heat Losses from Uncovered Pipe Surfaces,
assuming calm atmospheric conditions with air at 70° F.

Internal Temperature of Pipe ° F.	*Heat Loss in B.Th.U./sq. ft./hour.*
100	58
150	166
200	296
250	454
300	646
350	876
400	1142
450	1452
500	1810
550	2213
600	2617

Internal Temperature of Pipe °F.	*Heat Loss in B.Th.U./sq. ft./hour.*
650	3184
700	3750
750	4390
800	5110
850	5930
900	6830
950	7820
1000	8920

Assuming the average heat value of industrial coals to be 11,000 B.Th.U. to the pound avoirdupois, reference to the above figures will show that by applying a good non-conducting insulation to uncovered pipes and heating vessels of all descriptions a considerable saving is possible. In the latter case, if liquids are being splashed about and are liable to get on to the insulations it is advisable to have a metallic covering on the outside for protective purposes.

Old Pipes

When extensions or alterations of the layout of old factories have been carried out, it sometimes happens that due attention has not been given to the proper rearrangement of the steam and hot-water pipes, with the result that extensive lengths of unnecessary piping are left in commission. These might easily be short-circuited, which would not only eliminate radiation losses but also free the pipes and valves for use elsewhere.

Coal Quality

Another important point to look out for is whether the class of coal purchased is good value for money. The author is of the opinion that all coals should be sold on their calorific value, as obviously, in spite of all the classifications and varieties of this fuel, looking at coal, or knowing its name, does not convey much to the prospective buyer.

Using Coal Properly

Being satisfied that the coal is worth its price, it is very necessary for the buyer to know whether it is the best class of coal to use with the particular type of grate which is used in his boilers, and whether sufficient draught is available completely to burn up the fuel. If the draught is insufficient, it is worth while to make a careful search round the boiler settings with a naked light as, by holding it at brickwork joints any infiltration of cold air is at once indicated by the light being drawn to the interior of the boiler settings. Air leakages of this kind are common, and should be diligently searched for, as not only does the capacity of the boiler suffer for evaporative purposes but, in addition, the cold air mingling with the gases inside the boiler settings brings about a reduction of temperature which fuel has been burned to raise. Frequently the author has seen cases where caulking of the joints and crevices around boiler settings has immediately increased the draught available by 20 per cent., and in some cases this simple treatment has so much increased the evaporative capacity of the plant that plans have been abandoned for installing more steam-raising plant.

Unburnt Coal

Another wastage often noticed is that of unburnt coal going to the ash pile. This may not be a high percentage of the total purchased, yet in many factories (strange to say it usually happens in the small ones) quite a lot of waste occurs through careless cleaning out of clinkers. There are so many likely causes of inefficient production and consumption of heat that it would not be an exaggeration to say that in many factories anything from 10 to 25 per cent. of the fuel purchased is wasted, either in the manner suggested in the foregoing pages or in others less obvious.

Automatic Stoking—A Robot Stoker

This stoker works on the underfeed principle of firing, whereby the fuel is fed to the heart of the fire so that the hydrocarbons are distilled below the hot incandescent zone, thus ensuring smokeless combustion. Cheap graded coal can be used, effecting large savings in fuel costs, and the minimum of attention is required, as all machines over the No. 1 size are fully automatically controlled. This automatic temperature control incorporated aims at even temperature conditions without disturbing the efficiency of the firing. The surrounding grate of the firepot simplifies the removal of the fire ashes and also assists in the final combustion of the coal. In the event of a breakdown of the electrical gear this enables the boiler to be hand fired.

For process steam and industrial steam raising there is the underfeed stoker. This stoker also operates on the underfeed principle and is a self-contained unit, the fan, motor, and ducting forming an integral part of the machine. This stoker is for all flue-type boilers of the Economic, Lancashire, and Cornish types. With this machine fluctuating loads are met with ease, and due to the automatic control the hot-water temperature is maintained at a constant level, irrespective of the load.

CONFECTIONERY RECIPES

—*from the factory angle*

N. F. SCARBOROUGH, A.M.I.Mech.E., AUTHOR OF *SWEET MANUFACTURE*, GIVES SOME PRACTICAL ADVICE

IN THE production of almost any kind of sugar confectionery, the recipe or formula for the proportions of the particular raw materials to be used is obviously an item of the greatest moment. This importance manifests itself in several ways, some having but an indirect connection with the product as such.

First—The Recipe

In the first place, the recipe must be such that the product is pleasing to the consumer. This means that it must not only be good to eat, being neither sickly nor insipid, but with a "more-ish" flavour. It must also appeal to the eye, to which fact the tastefully arranged displays in the shops of good-class retailers bear witness. There are, of course, other factors besides the actual recipe, such as fancy packing, attractive boxing, perfection in the moulding or shaping of the confection itself and so on, entering into the appearance of any line, but no amount of *camouflage* in this direction can hide poor products.

Secondly, from the point of view of the shop-keeper, good keeping properties without the need for special storage are a necessity.

Costing

Thirdly, from the costings standpoint there is always the matter of keeping the raw material cost within the limits allowable for the particular article. This last item raises further difficulties in many cases, as owing to the public demand for products falling very definitely into certain price categories, as for instance 2d., 3d., or 4d. per quarter lb., the manufacturer is bound to create recipes based largely on considerations of cost.

As a case in point, there are for sale pastilles or gums at all prices from 2d. to 6d. per quarter lb., and even 8d. per ounce, so that the creation of a recipe for a pastille must of necessity call for consideration of selling price as a first essential. Furthermore, most manufacturing concerns have a certain definite price range for their products, and it is generally very difficult to market products out of that range. A particular firm may, for example, attain a certain reputation in the production of a range of varieties to retail at, say, 4d. per quarter lb., and, due to the excellence of the goods and the general demand, be able to obtain as a matter of course a shilling or two per cwt. more than most of its competitors for the same class of goods.

On the face of it all this may not appear to have very much connection with recipes, but it is nevertheless true that the extra small amount of money that can be allocated to the recipe in such cases does actually provide the explanation.

Compensating Price Fluctuations

Another aspect of the recipe problem develops from the fact that, of necessity, selling prices have to be maintained at fixed levels for considerable periods regardless of the minor fluctuations in the cost of raw materials such as occur almost daily in the markets. Provided that funds are available, astute buying can do much to offset such variations, and if at the same time it is possible without detriment to the product to make slight recipe alterations to compensate for the price fluctuations of the various ingredients, so much the better from the profit-making point of view.

Fashion, too, plays a great part in the trend of development, and the appearance of perhaps a new film of international appeal may create the opportunity for the introduction of some new twist to an old and forgotten recipe. Even in the factory itself there may be circumstances that have a very definite bearing on any recipe that may be involved. Limitations of equipment may render the economical production of one recipe impossible, while a small modification (having in mind the machinery available) may make practicable the manufacture of a better article at a substantially less cost.

Enough has now been said to demonstrate that the question of the evolution of a satisfactory recipe for commercial purposes is a complicated piece of work in many cases, and that in its finished state it represents a compromise between various widely differing requirements.

Jellies and Pastilles

To take a concrete example, it may be necessary to produce a new type of pastille or jelly for inclusion in a new assortment. The price of the proposed new line will have been agreed upon in conjunction with the selling organisation and the costings department, and this will in consequence determine the factory cost of the various components of the assortment. A well-organised factory will have approximate manufacturing costs for the various types of jelly that may be available for consideration set out with the various operations that may be necessary, such as boiling, moulding, cleaning and so forth. By a process of elimination the sum available for raw material costs is reached and the actual consideration of possible recipes may then begin. It will be appreciated that by tackling the problem in this way much time and effort may be saved in comparison with the trial and error method of making up recipes at the whim of the departmental chief, only to find that considerations of cost prohibit their use.

It is obvious that the cost of the basic raw material, sugar, cannot in the ordinary way be reduced, though it is possible within limits to alter the sugar-glucose ratio and thereby take advantage of the prevailing price differences of these two ingredients.

Jellying Agents

In the case of the proposed jelly under discussion the next item to be considered will be the jellying agent to be employed—*i.e.*, the gelatin, isinglass, fruit pulp or pectin. The consistency desired in the finished article will decide more or less which of these ingredients is selected. For instance, it may be decided that something of the fruit pulp type is preferred, so as to have a firm jelly and yet one that will give a clean bite when eaten. Cost permitting, fruit pulp, preferably apricot, would be the choice, but it might be necessary to substitute isinglass or agar-agar for this on the score of expense.

The question of flavouring essences has a bearing on the last point, as it is quite conceivable that if a really good-quality essence were used even at the cost of using the cheaper jellying agent the resulting product would be more pleasing to the palate. The same thing might apply in the case of a gelatin base jelly, when it might pay to use a rather inferior grade of gelatin in order to be able to use a better flavouring essence, as any slight deterioration in colour that might ensue would most likely be masked by the colouring matter and the crystallised sugar coating usually employed on such classes of goods.

Broadly speaking, it may be said that it is a very false economy to try and save money by the use of cheaper varieties of flavouring essences. All the effect produced on a purchaser by an attractively made and packed article is at once nullified if, to use a popular expression, it does not taste as good as it looks.

Price—a Secondary Consideration

The preceding remarks apply to almost any product in the usual range of sugar confectionery. There are certain manufacturers whose products reach a very high standard of quality; so much so that price is a very secondary consideration. In their case normal fluctuations of raw material values are of little account, as their total amount is but a relatively insignificant proportion of the selling price. The average factory producing and selling comparatively cheap articles at the minimum possible cost in the face of terrific competition is not in such a favourable position. The raw material cost is probably more than half the total value of the finished product, and it follows therefore that the recipe used is of the greatest importance.

Other Factors

As has already been mentioned, the primary importance of any recipe is to produce a palatable and consequently a saleable article, but, under present-day conditions, there are several other factors of almost equal moment, and these may be summarised, not necessarily in their order of relative importance, as follows:

1. Attractiveness and saleability.
2. Selling price of similar products.
3. Cost of materials.
4. Cost of manufacture.
5. Flexibility to allow for fluctuation of raw material cost and variation in performance.
6. Keeping properties.

Ideal Recipe

This list may not include all the factors that may exist in any particular factory, but it is given to show that the ideal recipe, ideal from every point of view, is very difficult to attain, being as it is a compromise between so many widely divergent requirements. It also goes to show why a recipe that is an unqualified success in one factory may be a practical failure in another, owing to differences in the organisation, its methods or its equipment. Even climate and water can play their part in rendering recipes liable to revision, and it has been proved that, using identical machinery and raw materials in, say, Switzerland and in England, it is impossible to secure identical results without some modification either of process or ingredient.

Progress and Food Packaging

Food is the biggest buyer of packaging. That industry, realising this, spends most of its resource and thought in evolving new packs and packaging methods for the food manufacturer. This review of some important developments is some indication of packaging's success in its efforts to please its biggest customer.

THE SUCCESSFUL outcome of a packaging problem depends upon proper collaboration between the manufacturer of the product to be packed, the maker of the container and the designer of the label. The time when the onus lay entirely upon the sales organisation is past.

This applies to each one of the multitudinous branches of the food industry.

Modern packaging does not consist solely of putting a product into a particular shaped container, ornamented with a suitable (or otherwise) label, but brings in the services of many phases of science and art. Packaging means, among other things, a closure exactly fitted to the nature of the product and the container. It means a well-calculated estimate of strength and choice of container material. It also means the study and production of conditions entirely outside the package itself, such as air conditioning, air filtration, whereby is produced favourable conditions almost amounting to asepsis, where this is necessary.

The introduction of the material in the package offers wide scope for the ingenuity of the engineer, involving as it does the necessity for rapidity of working and exactitude in weighing. The nature of the material composing the package relies not only upon its contents, their hygroscopicity, their reactions and the degree of their corrosive properties, but also upon tradition, which can constitute an overwhelming influence upon the sales angle.

The Tin Container

Originally closed by soldering the cap through which the product is introduced, the modern package for sterilised food is now, with some exceptions, sealed by the well-known "double seaming" process. Vacuum is obtained by heating the contents (unless they are already sufficiently hot to be sealed immediately after entering the can) in the exhaust box, which is to all intents and purposes either a steam or hot-water bath. During the exhaust the lid of the tin is only partially closed (clinching) so that free passage of air from inside the can is possible.

Certain meat packs are still closed by soldering and the vacuum obtained either by exhausting or by closing under vacuum.

[*Metal Box Co., Ltd.*

TAMPER-PROOF

Twice sealed for consumer acceptance.

A comparatively recent modification is the vacuum double seamer, which applies a vacuum during the closing operation. There seems no limit to the foods which may be "packaged" in tins in the sterilised state. One of the latest American packs is the winkle, hitherto not the article of diet so highly prized there as it is among certain classes of society in this country.

Non-Tamper Pack

A pack of Metal Box ensures that the consumer receives the product certain that the contents have not been tampered with during its journey from the factory. Known as the diaphragm lever lid tin, its interest lies in the specially moulded paper diaphragm which is spun on to the body together with the ring and lid *after* the tin is filled. Thus it is twice sealed, and the diaphragm cannot be broken in transit or handling.

The value of this special seal is largely psychological. The manufacturer who exploits the tamper-proof idea

will find customers among those who have been educated in recent years to look for such protection.

The tin is claimed to be suitable for all dry products that are liable to the effects of external conditions and could, therefore, be used for the packing of custard powder, baking powder and other hygroscopic products.

In a survey made by the American Institute of Package Research, which was published in the October issue of *Modern Packaging*, some interesting points were made on the subject of tamper-proof packs. The survey states: "One line of reasoning has led to the development of so-called tamper-proof packages. Here the aim is to prevent the counterfeiter from securing the various portions of a large number of packages which have already reached the consumer. If this source of packages can be cut off at some point, the counterfeiter is once again stymied.

Many ingenious methods have been worked out whereby packages are so constructed that once opened they may never again be restored to their original appearance. Such devices vary from the extremely simple tightly sealed shipping carton, which is destroyed in opening because its seams form its strongest portion, to so-called super closures or over closures which tear or break upon opening.

Among the counterfeit-proof materials are carton boards of various types. One type utilises a mark or brand printed underneath the coated surface of the board so that it will show through when the coated surface is moistened. Thus the mark is not apparent on either surface of the board, but becomes apparent whenever it is desired to test the carton for genuineness. In another type of board, the mark is made right into the pulp, and runs completely through the back liner of the sheet, where it can be seen on the inside of the carton. A third type is composed of several layers of various colours situated in the centre of the sheet. This type can only be detected when the carton is torn. The pilferage problems which occur in the store are of a different nature in that they usually involve small items of merchandise which can easily be placed into hidden positions on the person, particularly in stores where open display is a practice. The presentation of such items acts as a virtual invitation to shoplifting. Many manufacturers seek to discourage such pilferage by enlarging the bulk of their package far beyond that required by the nature of the product itself. One of the most widely used means of doing this is the stapling of vials, small bottles, bags and similar small packages to display cards. These cards are usually constructed of a size just large enough to prevent their being palmed, and a number of firms report very effective reduction of pilferage since the adaptation of devices of this sort."

Collar Can

Another Metal Box innovation is the collar can. This is a hermetically sealed container. To open, a key—either clinched or spot-welded on the lid—is used to remove the scored band around the top of the body. By stripping off this band the lid and body are separated, so producing a resealable plug lid which sets inside the "collar" fitted on the inside of the can.

COLLARED

The band comes off and there's a plug lid.

PLASTIC

When emptied, an egg-cup.

[*Metal Box Co., Ltd.*

Food in Tubes

Despite a superficial newness which is a first impression when thinking of packing foodstuffs in collapsible tubes, the idea is certainly not a new one.

In 1842 a patent was registered which dealt with "a compact, convenient tube holding one dose or application of a product".

But nevertheless to British eyes the appearance of a food packed in a tube would be startling. The reason is apparent when it is known that Crosse and Blackwell have been packing their anchovy paste in tubes *for export only* for over thirty years.

Many attempts to popularise food in tubes in this country have failed. Associated, as a tube is, with toothpaste and cosmetics, the idea of eating food from it apparently does not appeal to the British public.

The failure of tube-food in Britain can only be the result of prejudice. On the Continent all kinds of food, such as fish paste, meat paste, condensed milk, cream cheese, butter, mayonnaise, cream, cocoa and prepared mustard, are packed in tubes to be sold to an appreciative public. In favour of tubes the arguments of hygiene, convenience, resealability and compactness are advanced. Also they are light and flexible—both good selling points if the contents are to appeal to a travelling or holiday-making public.

The question of measuring the contents is another advantage of the tube. As an instance, anchovy sauce is usually made by measuring by the teaspoon from a bottle of essence. The operation would be simplified by instructions to squeeze a quarter- or half-inch of the prepared essence from the tube as the case may be. Meat products like Bovril and Oxo could also be measured by the inch if packed in tubes.

Tubes are claimed to be more economical than glass containers. Especially is this so when export is considered, the lightness of the tubes reducing freight costs.

Labelling is unnecessary, for a multiplicity of designs can be printed on the tube itself.

Universal Metal Products, Ltd., make aluminium tubes for food in this country, and are always ready to co-operate with manufacturers on the question of packing food products in these containers.

American Progress in Glass Packaging

Glass and pottery were probably the first of man's industries, and a very high degree was attained by glass makers in early times. In considering all this it is easy to think that there are no more avenues of investigation to be explored and that civilisation does, in fact, know all there is to know about glass. Contrariwise, the chemical and phase rule relations of the components of glass still challenge the best technical minds. The absence of fundamental theory has not, however, held back the advance of applied practice.

One of the major characteristics of glass is that of weight reduction which leads to economies in carriage costs. For instance, new American beer bottles save weight to the extent of 26 to 29 per cent. and effect a height reduction of 30 per cent. over the original shape. This weight reduction has not, however, endangered the strength of the bottle. A test made by a beverage cap manufacturer showed the bottle to have a vertical crushing strength of 3,500 lbs. to a maximum of 7,000 lbs.

An American firm, the Owens-Illinois Glass Co., has, it is claimed, succeeded, through studies made on equipment and handling methods, in passing 20-oz. food jars through a continuous automatic reel type steriliser and cooler at a speed of 150 units per minute without an increase in breakage over normal. Actual breakage figures taken during the commercial runs in this equipment have been strikingly low, only 0·04 per cent., or four jars in 10,000 units packed.

Certain American tomato products plants are filling and capping 220 bottles of catsup per minute. The bottles so preheated are filled at boiling temperature and capped under a 400-lb. impact pressure from the sealing machine. Before then 90 bottles per minute was top speed for such a container, but refinements in bottle making have led to these remarkable speeds.

In our own country progress has been made by firms such as Canning Town Glass Works, Ltd., Lax and Shaw, Ltd. (both of these firms specialise in glassware for the food industry and produce practically every type of container necessary) and Forsters Glass Co., Ltd., lately mentioned in FOOD MANUFACTURE as the makers of the jars used for Aplin and Barrett's milk products.

Sealing—A Problem Overcome

An outstanding development in cap compounds for the sealing of glass jars, etc., has been the invention by Dewey and Almy, Ltd., of a compound which can be used successfully in one-piece screw caps sealed on vacuumised packs. The difficulty experienced before this invention was that with a rubber ring gasket in the cap it was virtually impossible to unscrew a one-piece screw cap on a vacuumised pack after the jar had been packed for a few weeks because the rubber ring welded itself on to the glass, rendering the cap absolutely immovable.

Various methods were tried to overcome this difficulty, one of the most favoured ones being the use of paraffin wax either on the surface of the ring or on the surface of the glass, but this was not satisfactory because it was found that the wax disintegrated after a short time and the same difficulty as previously arose.

Much research was carried out on this problem, and eventually a compound was developed which was termed a lubricated compound. In this the lubricant is incorporated at the time of manufacture. This lubricant remains in the compound after it has dried into a film in

Swiss Tube for Food

Ready-for-use mustard packed in a collapsible tin tube made by a Swiss company. The mustard keeps fresh and moist and is protected from contamination until used.

Three types of waxed milk carton

PERGA

Sprayed and immersed in wax.

KLEENTAINER

The double wall forms another film of wax.

SATONA

Plunged into hot wax bath.

the cap, and any pressure between the glass and the metal causes a constant supply of lubricant to be squeezed out on to the surface of the rubber. Even after 12 months one-piece screw caps lined with this compound can be unscrewed with ease.

The compound was developed both for ordinary jam packs and for oily packs, and to both these types of compound the name "Slippo" was given. They have already been used in one-piece screw caps for certain jam and cream packs in this country.

Rubber Rings

Rubber rings for caps made by the Phœnix concern, cord rings for automatic closures and flat rings for re-seal caps are extensively used in connection with closures for food packs. Also used are unvulcanised gummi rings and the sealing compound for the bottoms and tops of tins which is known as Truseal and is made by the Poppe Rubber and Tyre Co.

Plastics for Food Packs

Although they have been used for some time in the form of caps for sauce bottles and other containers, plastics have yet to make appreciable progress as containers for food. Because of the durable nature of a plastic pack it is very often made in the form of some article of everyday use so that the appeal of getting not only the product but also some article which can be used when empty can be put forward as a sales argument.

An interesting example of such a pack has been put on the French market by Neff. It takes the form of an egg-cup pressed out in red bakelite and covered with a tin lid. This contains the concern's beef extract. When the extract has been used up the container can still serve a useful purpose as an egg-cup. Plastic material is not very expensive, so that the idea of a "re-use" container costs little or nothing more than would an ordinary packaging.

Cellulose acetate transparent material used in sheet form for transparent boxes is finding a ready market. Such boxes combine the presentation qualities of glass, which allows the product to be seen clearly, with that of being unbreakable in the same way as glass. One variety of this material, made by the British Xylonite Co., Ltd., is called "Bexoid", and has claimed for it easy manipulation and complete resistance to moisture.

Cartons

Cardboard cartons enjoy a very wide popularity for the packaging of many foodstuffs, such as custard powders, ground coffee, baking powders, gelatin crystals, etc. They are popular because they were practically the first forms of packaging possible when the branded product started its present marketing successes. But that the industry has not stood still is evident from the new ideas in cardboard packaging introduced from time to time. Among these is a device known as the "Pulopen" carton made by the Britannia Folding Box Co., Ltd.

This innovation is different from the ordinary glued carton because of the small flap at the top. When this is pulled it splits the special perforation, thus conveniently opening the packet for pouring out the contents.

It is manufactured in two styles: (1) made with a side flap which, although not glued, is by reason of its being doubled back as effective as the glued side in preventing the escape of the contents; (2) the perforation is made on the top centre panel and extends over the side;

when the flap is pulled the aperture is made in the side of the carton. This style does not interfere with the automatic gluing of the flaps.

Waxed Milk Cartons

Waxed cartons for milk are being increasingly used by dairies. To the dairies the manufacturers point out that there is a real economy to be had because of the elimination of collection, washing and sterilising and breakage costs.

There are, among others, three types of waxed milk carton on the market to-day, all made by British firms. They are the Satona, the Perga and the Kleentainer.

The Satona process is executed by one line of machines. First the material, a single sheet of thick paper, is automatically fed into one end, formed into shape and the bottom sealed, making a solid base. The cartons are then conveyed to the waxing machine four at a time and are dipped upside down into a bath of wax which has a temperature of 200° F. It is claimed that the force pumps inside the bath ensure perfect covering. Still four at a time, the cartons are filled with the exact quantity of milk and are subsequently sealed with a metal clip.

The Perga process produces a fundamentally similar container. In this process, however, the containers, after being formed, are sprayed both inside and out with a fine stream of wax. They are then immersed in a bath of hot wax.

Two separate pieces of paper are used for the Kleentainer, thus producing a double-walled carton. It is claimed that by this method the carton is thoroughly waxed because a film of wax is present between the outer and the inner wall. In the construction of this carton no glue or gum is used, the outer wall being ingeniously knitted together by a system of interlacing the paper. A metal seal is applied by hand.

Containers such as these are used for products other than milk. Orange juice is an instance. Because of the thorough impregnation of the wax there is no fear of chemical action between the juice and the carton.

Moulded Pulp Containers

These interesting forms of packaging are moulded from wood pulp with a design forming panels around the sides. The panels have more than a decorative purpose, for they provide air cushions which protect the container inside from damage.

Moulded pulp containers, as they are used to-day, are essentially outer packages for the protection of a more valuable container inside. Thus they are used very much in the whisky industry, where the contents have in addition to a bottle the safeguard of a tough outer cover.

The striking feature of these containers is the fact that they are moulded to the exact shape of a bottle, and may, indeed, be moulded to the exact shape of any other container which requires additional protection. In effect they form a thick skin on which can be embossed the name of the product.

Another advantage claimed is that this method of packing bottles saves considerable space, which in turn shows a saving in freight costs, as instanced by the export of whisky, which is measured in terms of sea freight.

But the function of "a container for a container" is not the only purpose of pulp packages. They are produced in various shapes suitable for packing powdered foods, and can be waterproofed to almost any desired degree.

Wrapped Poultry

Swift and Company provide news of two recent meat wrapping developments. In January, 1937, this company took over a factory at Lincoln and mass-production was introduced. The plant at Lincoln intensively feeds, kills and prepares for market 10,000 to 12,000 birds a week. The prepared birds are tied, compactly shaped, graded and cooled overnight in refrigerated stores. They are then packed into fibreboard boxes holding six birds.

A new development is the wrapping of the birds in Cellophane. This gives the wrapped carcase a much better appearance. An attractive label completes the picture.

Poultry now becomes a branded product protected from the contamination to which unwrapped birds are exposed. The extra cost is surprisingly low—2½d. for wrapping a box of six birds.

Veal

In America, Swifts are wrapping veal carcases in specially prepared cotton muslin. This is used in conjunction with a "humidor" paper bag to protect the freshness of the veal from the time of dressing in the packing plant until it reaches the retail market.

Previously, in order to preserve the delicacy of the veal meat, the carcases were sent to the packing plants with the hide still on. This was inefficient economically, as

Moulded "Skins" for Whisky

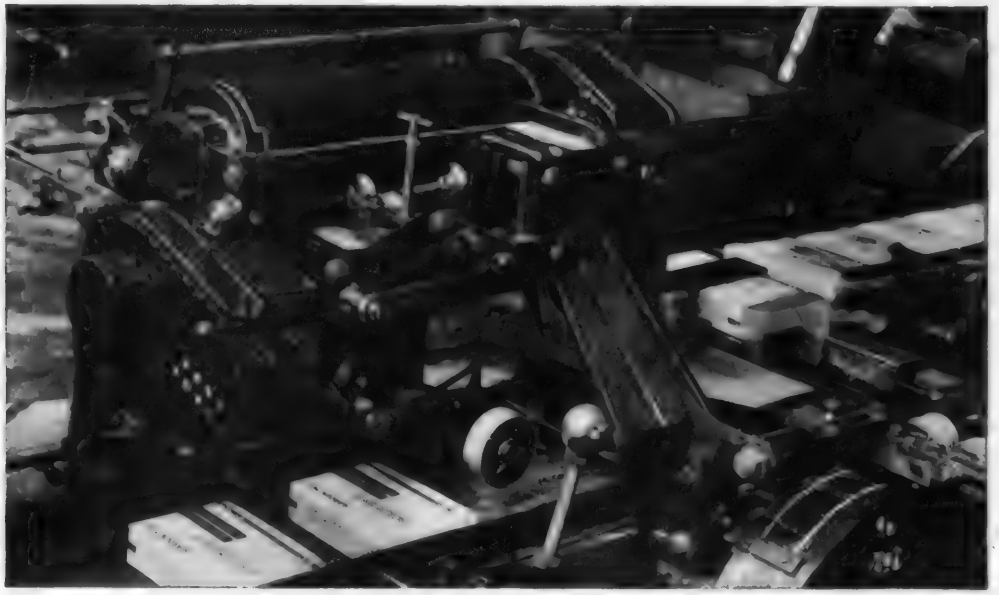
These single piece protectors made by Universal Pulp Containers, Ltd., are used by many distillers to protect their bottles of whisky. The brand name is embossed on the outside; the container thus protects and advertises at the same time.

Wrapping veal in muslin; peas in Cellophane

[*Modern Packaging.*

SWIFTS

Muslin saves hides.



[*British Cellophane, Ltd.*

SMEDLEYS

Overwrapping the cartons which hold envelopes containing peas.

the hides were sent at fresh meat freight rates when they might have gone to the tanneries as a separate item. In the new system, a cotton cloth, specially prepared to prevent loss of moisture while the meat is in transit, is wrapped tightly round the carcase, after which a special paper bag is pulled over the carcase and rolled at the top. This permits enough air to reach the inside so that "smothering" is prevented, while, it is claimed, there is no drying out, discoloration or other deterioration.

Another advantage is that brand names can now be applied to veal (by patented cellulose strips down each side of the carcase), impossible when the hide was left on.

Latex Covering

Latex covering is meeting with considerable success on the Continent and in the U.S.A.

This consists of wrapping quarters of beef, before quick freezing, in a special latex skin bag, in which the air is withdrawn and the bag sealed. By this means an artificial film is obtained, held in place by positive adhesion, no matter how irregular is the surface of the product treated. The beef is wrapped before being quick frozen, and remains so until it reaches the consumer. Not only beef, but many other food products are being treated in this way. A description of this process was given in the July, 1938, issue of FOOD MANUFACTURE.

Fruit Wrappings

Investigations which bid fair to revolutionise the handling of delicate fruits and vegetables are being carried out at the present time. The life of tomatoes may be considerably prolonged by wrapping them in paper impregnated with volatile phenylic compounds.

Further Developments in Cellophane

The use of transparent cellulose film for food wrapping is becoming extensive. One of two new uses described here is that of the wrapping of Smedley's quick-frozen foods in Cellophane.

Its use enters into the process thus: The produce is freshly picked, then frozen to a temperature of below 35° F. It emerges as hard as a block of wood and is packed into Cellophane envelopes. It is then inserted by hand into an outer carton and overwrapped. The entire package is finally frosted.

The frosting and packing of green peas is interesting. When the peas have been extracted from the shells, washed and graded, specially selected peas are partly cooked and then re-washed. They are then packed into envelopes of moisture-proof Cellophane, heat sealed and inserted into an outer carton, which is again overwrapped. The cartons are then frozen.

The heat-sealing, moisture-proof type of Cellophane is almost invariably used for the wrapping of ready-sliced bread. Such wrapping keeps the bread very fresh, but it is necessary for it to be properly cool before wrapping; this prevents the possibility of mould formation.

MACHINERY

Counting Packages

Chief among the recent refinements in packaging machinery is the development of the photo-electric cell for counting packages such as loaves of bread, bags of sugar, etc. Typical of this device are the "Radiovisor" made by Radiovisor Parent, Ltd., and the "Osram" produced by the General Electric Co., Ltd.

The Radiovisor counting unit consists of a conveyor system worked in conjunction with light-ray apparatus. A light-ray is focussed across the conveyor to the Radiovisor selenium cell at such a height as to catch all the articles carried on it. As each article crosses the ray it shuts off the light momentarily from the cell, the resistance of which changes; advantage is taken of this change to operate a relay which in turn operates the counter. The Radiovisor apparatus can operate at equivalent counting speeds up to 600 articles per minute and light intermissions as short as one-fiftieth of a second.

The Osram apparatus consists of three separate units—(1) the photo-electric amplifier which contains light-sensitive cells, valve amplifier circuit and relay. This is mounted on one side of the space across which the articles to be counted will pass. (2) A light, which may be an ordinary gas-filled lamp or a special optical system depending on circumstances. (3) An electro-magnetic counter operated from the supply mains and controlled by the relay in the amplifier.

When the articles to be counted pass the ray of light the illumination of the photo-cell will be cut off. This action operates the electro-magnetic counter.

It is claimed that the simplest type of gear counting with such apparatus can be carried out at about 200 a minute, and that there is no difficulty in giving impulses to the relay with fairly simple equipment up to about 1,000 a minute.

Filling

Somewhat of an innovation is a filling machine for loose materials. These are so constructed as to discharge regular quantities of granular powder at intermittent intervals. It is possible to control the amount discharged by hand-screw adjustment while the machine is running. Its speeds are from 12 to 45 per minute.

A feature of the machine is the dust-collecting attachment which gathers the dust from the mouth of the container being filled, thus adding to the comfort of the operator and saving material which would otherwise be wasted. This machine is made by J. G. Jackson and Crockatt, Ltd.

A machine of a different character, although fulfilling the same essential purpose, is the continuous rotary syruping machine of Robert Kellie and Son, Ltd. This machine automatically fills cans or glass jars to within an exact distance from the top regardless of the quantity of fruits or solids filled into the cans. This machine is fitted with a "no-can no-fill" arrangement which prevents wastage. Its capacity is 40 to 80 cans per minute.

A recently evolved machine for filling fresh cream into jars has been introduced by Albro Fillers and Engineering Co., Ltd. This machine is mounted on a flat platform, which provides space for the receptacle which holds the cream, such as a churn. The jar to be filled is placed on a spring loaded platform, which raises it to the filling head. A foot pedal is operated to lower the table and the filled jar for changing. A stainless steel interceptor is fitted to take the overflow of cream from the jar before it is removed.

An interesting machine for the tightening of screw caps on bottles and on jars up to 1¼ inches or 32 mm. diameter is produced by Farrow and Jackson, Ltd. It is hand-operated, and its main mechanism is a tightening head with a renewable rubber cushion. This does not revolve until the cap touches it, which is intended to eliminate damage to the cap.

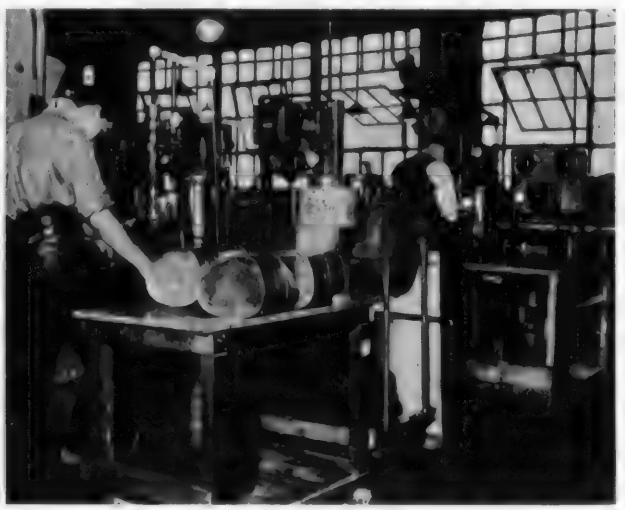
Vacuum seaming machines for either round or oval cans and vacuum capping machines for fixing "Phœnix" or screw caps on glass jars under vacuum are specialities of Ashworth and Parker, Ltd.

[*Concluded on page* 416

Counting loaves by "light-ray"; vacuumising ham packs

"MAGIC-BEAM"

The Radiovisor counting unit installed on a conveyor, counting loaves of bread as they pass and intercept the "Light-ray."



HIGHER VACUUM

This installation by Premier Filterpress, Co., Ltd., produces a final vacuum in the closed can.

FOOD RESEARCH DISCUSSED

by the Royal Sanitary Institute at Cambridge

RECENT WORK IN FOOD PRESERVATION

AN EXCELLENT résumé of the present state of knowledge of the subject was given by R. J. Tomkins, M.A., Ph.D., in a paper read at the Sessional Meeting, presided over by Dr. Charles F. White, M.D., D.P.H., D.T.M., of the Royal Sanitary Institute at Cambridge on November 4. After briefly following the history of food preservation from its earliest times, the author traced the factors largely responsible for modern trends in food preservation, which included (1) the improvements made in refrigerating machinery and the introduction of dry ice; (2) large-scale planting of fruit trees in countries overseas and the problem of using culls; (3) research into problems of food preservation; (4) the prohibition of the use of preservatives in accordance with the Public Health (Preservatives in Food) Regulations, 1925.

Chilled Meat Industry

Turning his attention to meat, the author stressed the recent improvements in the chilled meat industry, which had been attained by attention to (*a*) ante-mortem factors, (*b*) hygiene in preparation and handling, and (*c*) the introduction of gas storage.

Fruit Storage

With reference to fruit, Dr. Tomkins called attention to the advances in the storage of fruit, due to (1) improvements in orchard and in handling practices; (2) investigation into the "best" temperature of storage and methods of cooling fruits; (3) the discovery of "gas" storage; (4) the use of ethylene for conditioning fruit.

Fruit Juices

Fruit juices were being sold in increasing quantities. The bulk of these are preserved by the use of sulphur dioxide or benzoic acid, but increasing amounts are being preserved (1) by pasteurisation; (2) by ultra-filtration; (3) by carbon dioxide under pressure; (4) by concentration by freezing. Another interesting development is the clarification of juices by the use of enzyme preparations.

The frozen pack method of preserving fruit and vegetables was briefly touched upon, as also were advances in the canning industry.

Dr. Bradley's Paper

At the conclusion of Dr. Tomkins' paper, a discussion on "The Prevention of Droplet Infection, with special reference to Streptococcal Disease", was opened by W. H. Bradley, B.A., D.M., M.R.C.S., L.R.C.P., Research Assistant, Department of Medicine at the University of Cambridge.

LOW TEMPERATURE RESEARCH STATION

On the day following the Sessional Meeting, members of the Royal Sanitary Institute and their friends went by invitation for a tour round the laboratories of the Low Temperature Research Station, Department of Scientific and Industrial Research.

After a brief welcome by the Superintendent of the Station, Dr. Franklin Kidd, the visitors split up into parties and received a very vivid impression of the important work in progress—work which cannot fail to have important repercussions upon the food industry.

In each laboratory a description of the work was given by one of the actual investigators.

An interesting talk upon the various effects of ante-mortem factors on quality of meat was given in the first laboratory visited.

Resting of Animals

The importance of ensuring that animals slaughtered for consumption should be well rested at the time of death was stressed, and the scientific reasons for this have been ascertained. The muscular tissues of the living animal contain glycogen. When the animal uses its muscles in walking, running, or standing, or even in shivering, part of this glycogen is used up, and it is only restored when the animal has rested.

Role of Glycogen

Fatigued animals have less glycogen in their muscles than have well-rested animals, and the dead flesh from the animals will thus contain less lactic acid and have a less acid reaction than that from well-rested animals. After-effects of fatigue in the pig are shown when the legs are used to make very mild dry-salt-cured hams. For this purpose only well-rested animals can be used successfully, and half the hams from tired animals may be spoiled by the growth of anaerobic bacteria near the stiflex.

Electrical Resistance

The differences in internal structure due to the acidity of the flesh are reflected in the electrical resistance, which is high for high values of *p*H (low acidities) and low for low values of *p*H (high acidities). The apparatus used for determining the electrical resistance was exhibited and its sensitivity stressed. It is possible even to tell how long pigs had been shaken about in a railway wagon on the way to the slaughter-house! Some further interesting details regarding experiments on growth, with a view to producing the ideal bacon pig, were also described.

Egg Investigation

In the laboratory set aside for experiments on eggs, methods of testing for freshness, etc., were demonstrated, and the processes which went on during progressive staling of eggs described.

The effect of CO_2 storage was said to produce eggs giving a better hatch than fresh ones. An ingenious method for determining the strength of a membrane of the yolk by means of using an isotonic solution of sugar

was demonstrated. One very interesting point that emerged was that the quality of eggs as regards storage properties, etc., was fixed by the hen itself, and that no particular breed could be said to produce better eggs in this respect than another breed.

Polysaccharides

In another laboratory work on polysaccharides and researches upon the effects of enzymes and the mechanism of the reactions were explained. Much light is being thrown upon the constitution of these compounds.

Cold Chambers

The visitors were conducted into one of the fifty chambers whose temperature and humidity are controlled within very narrow limits. In the laboratory was demonstrated the effect of humidity on flour.

Some very interesting samples of tomatoes which had been wrapped in paper treated with fungicides were shown. This system of prolonging the life of such perishable goods as tomatoes seems to have considerable possibilities, and it is being intensively studied, as are other means to the same end.

Rancidity of Fats

The work of another laboratory is mainly concerned with the study of fats from the point of view of prevention of rancidity. One outstanding experiment has been to feed pigs on various kinds of oils and fats, and it has been found that the fat of pigs merely fed on small quantities of different oils and fats as accessory factors, partakes of a similar liability to rancidity as the fats themselves.

Enzymes

The enzymes of muscle juice and their influence upon fats during storage at low temperature is being studied by the use of an emulsion of muscle juice and fat.

Other investigations include the effect of ozone, ultra-violet rays, metals, etc., upon the fat in milk and other fat-containing foods.

Conditions in Ship's Hold

In the engineering laboratory the various methods of controlling temperature, humidity, and CO_2 content were demonstrated. Temperature could now be controlled, in the ship's hold, to within one-twentieth degree F. Testing instruments of all kinds, such as wet resistance thermometers, wet and dry bulb, were shown, as also a gas-testing instrument which gives a direct reading of CO_2.

The quick freezing of vegetables and fruit is being followed up in one of the laboratories of the station. In the same laboratory, canning problems such as hydrogen swells are being investigated.

Some very patient and original work is being carried out on the nature of *rigor mortis*. Physical and chemical effects are being investigated.

Progress and Food Packaging (*concluded from page* 414)

Weighing and Packing of Dry Foods

Tea, sugar, coffee, cocoa and cereals are some of the products which can be filled by a combined machine which weighs and then fills the cartons. The operation consists of placing the empty cartons on an inlet conveyor, when they are fed automatically into the rotating table. The cartons are registered under the filling outlet and filled with accurately weighed quantities of the product at a speed of from 60 to 90 per minute. The whole operation is totally enclosed. Southall and Smith, Ltd., make the machines.

Flour filling is performed by a packing installation by the Automatic Weighing and Packing Machine Co. The bulk feed is by a patent hopper fitted with mechanical stirring apparatus with synchronised control; this hopper works only when the machine is in use, thus preventing a jam and a period of bad weighing. With recent improvements speeds of 16 to 18 weighings per minute on weights up to 3½ lbs. are possible, giving a daily output of 50 to 60 gross bags per day.

Carton Wrapping

The wrapping of cartons in transparent papers, wax-backed foil or paper wrappers cut from a roll with photo-electric registration of printed wrappers if desired is within the scope of a machine made by Baker Perkins, Ltd.

The operation entails two crank motions which drive all parts that reciprocate. The material, in roll form, is handled by a continuous feed mechanism equipped with automatic trip gear, which prevents paper being fed when no package is present. The packages are fed, wrapped and discharged in a straight line through the machine.

Air Conditioning

Most classes of foods are affected by changes of temperature and humidity, either alone or together. In the packing room the conditioning of the air is especially important, because in this last process before leaving the factory the product can be damaged by permeation, putting to naught all the work of manufacture.

Two types of air-conditioning units are made by Air Control Installations, Ltd., for the food factory. One effects attemperation with dehumidification and the other attemperation with humidification.

The air-washer type is normally employed, the most striking feature of which is the fact that air can actually dry the air by wetting it, but at scientifically selected temperatures and by subjection to other treatment on entering and leaving the washer.

The air is delivered, irrespective of the entering conditions, cleaned, purified, filtered and proportioned in optimum conditions and quantity to the individual consumer points with the aid of distribution systems.

Another method is that of Ozonair, Ltd. This system is claimed to destroy any odours which may be present in the packing room.

"The jellies are clear and bright in appearance and stand up well to unfavourable conditions of storage."

PECTIN

ITS SOURCE, PRODUCTION AND USE IN FOOD MANUFACTURE

S. M. TRITTON, M.P.S., F.I.C.

ALTHOUGH THE existence of a jellying substance in the cell walls of vegetable matter was mentioned by Vauquelin, Payen and others before 1817, the first scientific investigation on this jellying principle was carried out in 1825 by Braconnot. He gave it the name Pectin, after the Greek, *Pektis*, to jelly. It was extracted from ripe fruits, and even artificial jellies were prepared from a mixture of the fruit extractive and sugar.

Pectin has since those days become a most important item in food manufacture and much work has been carried out on its chemical and physical properties, purification and practical application. Masterly reviews of this substance have been prepared by R. Sucharipa (1925), *Die Pektinstoffe*, a new edition of this book having just appeared, and M. H. Branfoot (1929), "A Critical and Historical Study of the Pectic Substances of Plants," Special Report, No. 33, of the Food Investigation Board.

Despite a century of study the chemistry of pectin is still being investigated. Some of the earlier work was invalidated owing to the impurity of the products investigated, and it has been found that pectin not only varies with its method of manufacture but also seems to vary in some of its properties according to the plant from which it has been obtained. Further difficulties in sorting out the pectin literature arise from the fact that different investigators have used different names for their products.

The Nomenclature of Pectic Substances

Plants contain a substance in their cell structure which serves to hold the cell together and is considered to be a water-insoluble cellulose compound. This compound has been given various names, protopectin and pectose being the most usual ones. Of recent years "pectose" has been largely adopted. This pectose is decomposed by a plant enzyme, pectase, and will give rise to a water-soluble mucilaginous substance called pectin, which may show varying composition and often contains traces of calcium and magnesium salts of pectic acids.

Pectin is the name given to a methoxylated form of pectic acid. When pectin is hydrolysed by dilute acids, pectinic acids are the first products formed. These contain fewer methoxyl groups than pectin, and on further treatment with acid or alkali the entirely demethoxylated product, pectic acid or its alkali salt is produced. Further hydrolysis of this acid leads to the final product, metapectic acid.

The Chemistry of Pectin

As already mentioned, the chemistry of the pectins is still under active investigation. It has been proved that pectin contains methoxyl groups; Fellenberg believes in the existence of eight, and as these are successively re-

moved, pectin becomes steadily more acid and more water-insoluble and gives, through a series of pectinic acids, a completely demethoxylated acid, pectic acid. By treating pectic acid with sodium hydroxide, metapectic acid is produced. This appears to be identical with *d*-galactose-galacturonic acid, which Ehrlich obtained as a hydrolytic decomposition product of pectin and pectic acid. Both substances are amorphous, water-soluble and form water-soluble salts with the alkaline earths.

Pectic acid is soluble in ammonia, precipitated from solution by acids, and forms an insoluble calcium salt, a fact that is made use of in the analysis of pectin. Pectic acid is soluble in water up to about 1 per cent.

Various formulæ have been suggested for pectin. The one most quoted is that of Nanji, Paton and Ling, who assign a ring structure to it. They consider pectic acid to be a six-membered ring, of which the members are one molecule of anhydroarabinose, one of anhydrogalactose and four molecules of galacturonic anhydride, the four carboxyl groups being free, and in the case of pectin these groups being methoxylated. Diversity of opinion exists concerning the number of these methoxyl groups; analysis by Zeisel's methoxyl method gives in most cases three groups, less in degraded pectin and more in pectins from some sources.

Ehrlich first suggested that pectin contains basic units containing four galacturonic acid molecules. This has been disputed by Morrell, Baur and Link, who consider that the polygalacturonic acid in question contains approximately 10 galacturonic acid units. Schneider and Boch also disagree with Ehrlich and with Nanji, Paton and Ling's theory, and believe pectin to have an extended chain molecule analogous to the cellulose molecule. This receives support from the X-ray investigations of Henglein and Schneider. It seems very probable that pectins not only vary according to the method of extraction but also according to the source. One may therefore define pectins as those substances which are obtained from the cell structure of plants by hydrolysis with water, are precipitable by alcohol, will redissolve in water and produce with suitable concentration of acid and sugar a rigid jelly-like structure.

Tests for Detection and Evaluation of Pectin

A method for the detection of pectin is described by Ehrlich. It is a typical reaction given by *d*-galacturonic acid or hydrolysed pectin with a freshly prepared and filtered basic lead acetate solution. First, a colourless precipitate is formed which redissolves as more reagent is added. If the clear solution is heated on a water bath, a pink colour or red precipitate will be formed, depending on the concentration; the supernatant liquid should be nearly colourless. Five mg. of *d*-galacturonic acid give a distinct precipitate.

The estimation of pectin presents some difficulties; two main methods being employed. The first consists in precipitating pectin from an aqueous solution by adding alcohol, or preferably acetone, to a concentration of 50 to 60 per cent. The sample for testing should contain between 0·05 and 0·1 per cent. of pectin in about 100 c.c. The acetone is added, a trace of hydrochloric acid or sodium chloride then added to help flocculation, and after standing 20 minutes the precipitate is filtered off either through a fast filter paper or copper gauze.

The precipitate will vary in appearance and toughness, and an experienced tester will be able to judge the jellying quality of the pectin. The precipitate should be washed till free from chloride, if necessary be redissolved in water and reprecipitated, and finally dried at 105° C. on a tared filter of known ash, weighed and ashed, and from the final weight found, half the ash is subtracted to give the yield of "pectin".

The second method is that of Carré and Haynes, in which the pectin is decomposed by alkali and calcium chloride is added to the solution acidified with acetic acid, the precipitate finally being weighed as calcium pectate and calculated to pectin by multiplying by the factor 0·93.

Although Carré and Haynes' method is widely used, from the consumers' point of view it is not a reliable guide to the jelly strength of the pectin even if this is first precipitated from solution by acetone and the precipitate redissolved in water and tested by Carré and Haynes' method. Preliminary acetone precipitation ensures that only pectin and not pectic acid will be estimated.

Further tests for pectin are viscosity tests. Some advocate simple viscosity measurements such as the time of flow of a certain volume, as, for instance, for a 10-c.c. pipette under standard temperature conditions compared with water, while others prefer resistance to movement of a rotating disc. It has been proved that the viscosity of pectin solutions are directly proportional to the concentration of the pectin.

From the users' point of view, probably the only way of assessing its value commercially is actually to make standard jellies and compare them with similar jellies made from a pectin of known jellying power under identical conditions at the same time.

Practical trials on solutions containing 65 per cent. sugar, 0·3 per cent. tartaric acid and varying quantities of pectin will soon give the jelly strength. Most pectins sold nowadays are standardised to form satisfactory jellies with a certain weight of sugar, the final sugar concentration to be 65 per cent. It is possible to obtain dry pectin of "100 and 160 grade", each pound of the pectin being sufficient for 100 or 160 lbs. of sugar respectively. Similar standards have been adopted for liquid pectins which are usually "about 5 grade".

MANUFACTURE OF PECTIN

1. Apple Pectin

The fruit used should be on the unripe side, as on ripening the pectose of the fruit becomes converted by means of the enzyme pectase to soluble pectin, which will be partly lost in the expressed juice. The residue from cider manufacture is called "pomace", and it is preferably dried, as manufacture of pectin from the fresh pomace will cause undue disintegration of the mass and lead to filtration difficulties. The pomace is best dried in kilns by hot air, as drums are apt to overheat. It should be heated to 85° C. at as early a stage as possible to inactivate pectase, which otherwise will hydrolyse the pectose to pectic acid.

The pomace is first leached with cold water to remove

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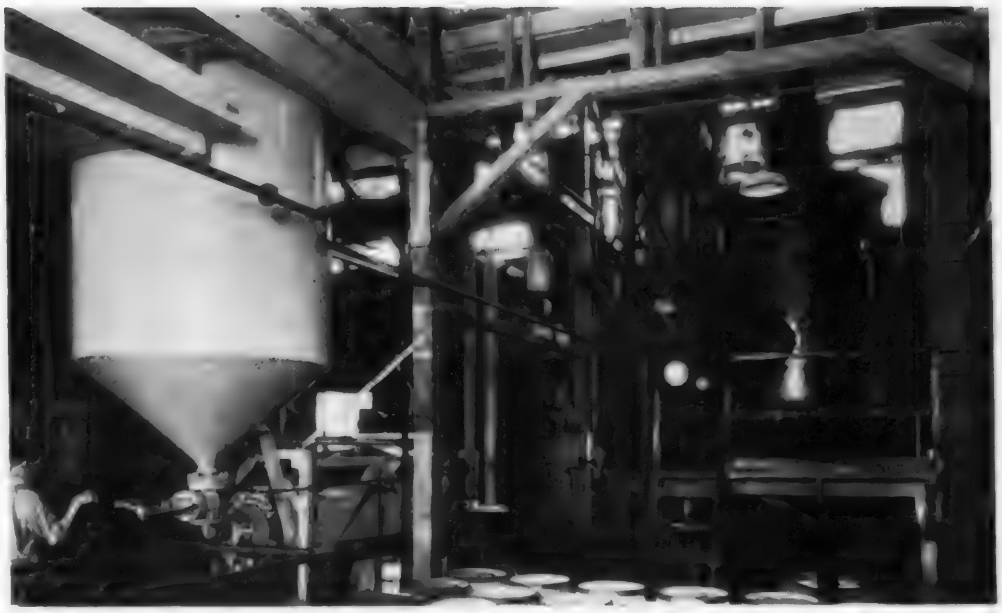

View in the pectin plant Exchange Lemon Products Co., Corona, California.

sugars, starches and undesirable colouring matter, and although this water will contain some of the soluble pectin, this is not a very high-grade product as regards jellying power, so that the loss cannot be considered serious. Pectin extraction is then carried out by leaching with acidified water as near as possible to boiling temperature in a wooden tank having a false bottom. Tartaric, citric or lactic acids can be used for this purpose, or, if mineral acid is preferred, hydrochloric or phosphoric acid is suitable. The pomace is kept in motion by an agitator and after 1 to 2 hours the mush is run into an extractor and finally the solid mass is well pressed.

The liquor, which is hazy and dark, is centrifuged to remove suspended particles, quickly cooled to prevent loss in jelly strength, and subjected to enzymic clarification. Diastase will bring about considerable clarification, as starch is the main cause of clouding, or an enzyme which has proteolytic besides diastatic properties can be used. Such an enzyme is obtainable from the mould *Aspergillus oryzæ*.

The enzyme, whether diastatic or proteolytic, may contain pectase and has therefore to be inactivated finally by bringing the pectin liquor to about 85° C. for 10 minutes. Decolorisation may then take place by means of activated carbon followed by filtration through kieselguhr. The liquor is passed through a filter press and can then be either concentrated under vacuum and adjusted to a definite jellying strength or dried by the usual spray driers and again adjusted to a known strength.

The product can be still further purified by precipitating from aqueous solution with about 3 volumes of 90 per cent. alcohol, drying in vacuum ovens and powdering.

2. Citrus Pectin

In the manufacture of pectin from the hulls of citrus fruits, the intense bitterness of glucosides, such as naringin in grapefruit, and others of unknown constitution in the hulls of lemons and oranges, proves a great drawback.

Hesperidin, the cluster of crystals rendered easily visible by treating a cross-section of the peel with alkali, has been found to be non-bitter. The peel can be dried and extracted with alcohol to remove bitter substances, but a method that has proved less costly is first to leach the peel with cold water, extract with hot acidified water, concentrate to a paste containing about 25 per cent. total solids and extract this with repeated small quantities of denatured alcohol. If pectin is manufactured from the albedo—*i.e.*, the whites under the skin of the fruit—the bitter principle is claimed not to present any difficulty.

An interesting account of the manufacture of citrus pectin is given by C. P. Wilson (1925, ***Ind. Eng. Chem.***, **17,** 1065-1067). Advantage is taken of the fact that pectin is a lyophillic colloid carrying a negative charge and can be precipitated by a chemical carrying a positive charge. After the pectin has been leached from the skins of fruit by water containing sulphurous acid, it is precipitated from the liquor by adding aluminium sulphate and ammonium hydroxide.

The mass is violently agitated when the incorporated air will cause the precipitate formed to rise as a scum, which is then collected, dried and powdered. The product is a mixture of pure pectin and aluminium hydroxide. The latter can be removed by suspending the powder in 85 per cent. alcohol containing 10 per cent. of hydrochloric acid, when the insoluble pectin can be filtered off and washed with pure alcohol till free from acid. The dried pectin is of a good colour and is usually adjusted to a standard jelly strength with some inert matter, such as powdered dextrose.

PECTIN IN FOOD MANUFACTURE

Jam Manufacture

It was realised more than 100 years ago that certain fruits would not produce well-set jams. In those days the

housewife resorted to apple juice for the cheaper jams and jellies and, in the case of raspberries, red currant juice was considered a useful adjunct, not only because of the better jelly formed, but also because the acidity of red currant juice improved the rather insipid raspberry flavour. That this acid was necessary to give firmness to the jelly has only been proved of recent years.

Although pectin has helped in the production of the high-grade jams of commerce, it does not follow that it is added to all jams. It is only used in the case of jams made from fruit somewhat poor in pectin, such as raspberry and strawberry, which require increased jelly strength. Many other jams, if of full fruit standard, will withstand practical conditions of storage and transport. It is possible to produce lower-grade jams, containing only about 20 per cent. of fruit, by the use of added pectin.

Sugar

When using pectin in jam manufacture it is advisable to add it to the boil prior to adding the whole of the sugar. If the addition of pectin is left to the last, pregelation sometimes takes place, which will give a poor set to the jam. When using dry pectin it is usual to mix the pectin with a portion of the total sugar, so as to prevent clumping when adding to the liquid boil. Although boiling pectin with acid and sugar for a short time does not seriously affect the jelly strength, too long boiling should be avoided.

To obtain a jam which will neither crystallise nor grain, the presence of a certain amount of invert sugar is necessary. Some manufacturers will use invert sugars as such, others resort to long boiling of the jam, which is not conducive to good colour, while others add an invert syrup to the jam boil. This syrup is prepared by boiling a cane sugar solution with tartaric acid, after which a certain proportion of this syrup based on its degree of inversion is added in replacement of some of the cane sugar, due allowance being made for the water in the syrup.

As stated previously, maximum jellying is obtained if the sugar concentration is at 65 per cent., the acid 0·3 per cent. in the case of tartaric acid or 0·45 per cent. if citric acid, but due allowance must be made for the natural acidity of the fruit. A practical formula for strawberry jam, both for full fruit and lower fruit standards, follows. The sugar here is shown as cane sugar but, as mentioned, the manufacturer can easily invert a proportion of this sugar and thus reduce boiling time. Allowance must then be made for the water used in the syrup and a correspondingly lesser quantity employed in the jam.

Formula for strawberry jam:[1]

	Full Fruit Standard.	*Lower Fruit Standard.*
Fresh Fruit	66 lb.	30 lb.
Water	2½ gal.	3½ gal.
Sugar	100 lb.	100 lb.
100-grade citrus pectin	9 oz.	16 oz.
Tartaric acid (crystals or powder)	4 ,,	5 ,,
or		
Citric acid (crystals or powder)	7 ,,	8 ,,
Approximate yield	156 lb.	150 lb.

The pectin plant of the Exchange Products Co., Ontario, California.

Confectioners' Jellies

Recent years have brought great strides in the use of pectin for the manufacture of confectioners' jellies. These jellies have a fineness of texture lacking in gelatin sweets. According to the formula used, they can be made tender or firm. The jellies are clear and bright in appearance and stand up well to unfavourable conditions of storage. They do not require long periods for drying, but care must be taken that they are not packed warm, as this may bring about sweating. A difficulty sometimes experienced by manufacturers is that such pectin jellies are inclined to set too quickly. This has been overcome by the use of a special buffered pectin or by a method whereby the manufacturer delays setting time by the addition of a buffer to the boil. This is covered by B.P. 396,749.

To obtain first-class products, the batch of jelly should be cooked to a minimum of 78 per cent. soluble solids and should contain not more than 50 per cent, and preferably less, of the total sugar as glucose, and boiling should be as short as possible to reduce sugar inversion. Here, again, the pectin particles should be separated by mixing with some of the sugar and, as pectin is more easily soluble in water or dilute sugar solutions than in a strong syrup, the bulk of the sugar should only be added after the pectin has completely dissolved. It is important that the salt which delays the setting time of pectin is added before the glucose. The acid can be incorporated at the same time, but if left to the last, least inversion of sugar takes place.

Within certain limits the manufacturer can alter the setting time of the pectin to suit his convenience by adding more buffering salt and acid. The buffering salt used is sodium citrate or sodium acetate. The latitude in time of setting is not quite so great in a ready-buffered pectin,

but sometimes the use of this is more convenient. Boiling temperature is most important; 222° F. at sea level will give good jellies if starch deposited, while at least 2° higher temperature is required for slab jellies. Setting generally takes place at 190° F.

Formulæ for pectin jellies vary according to the type of sweet desired. A formula given by Jensen in the book *The Chemistry of Flavouring and the Manufacture of Chocolate, Confectionery and Cocoa* is:

Pectin 100-grade	2·5 parts
Sugar	75 ,,
Glucose	23·5 ,,
Tartaric acid	1 part
Water	80 parts

which may be contrasted with a formula for a special slow-setting pectin:[2]

Pectin	2·5 parts
Sugar	50 ,,
Glucose	50 ,,
Citric acid	0·68 part
Water	50 parts

As the temperature of the boil has to be about the same in both cases, the final yield of product will be about equal. If these pectin jellies are mixed with starch mixtures good Turkish delight can be obtained.

Pectin in Mayonnaise Sauces and Condiments

Research has shown that pectin is an admirable stabiliser for all types of emulsions. The incorporation of quite small quantities of pectin—in fact, less than 0·2 per cent.—in a mayonnaise will ensure that the globule size of the oil will be and remains much smaller than if pectin were absent.

Further, if more pectin is used the egg content can be safely reduced, and the water content of the finished product can be increased if the amount of pectin is increased. If the aqueous phase in a salad dressing is 75 per cent. of the total product 1·5 per cent. of pectin is required, while 1 per cent. of pectin is suitable for a cream containing 50 per cent. of water. If pectin is used as a stabiliser in a sauce or condiment the quantity varies from 0·15 to 0·5 per cent. according to the formula.

Another useful function of pectin is its buffering action. Sauces and salad dressings are preserved by the presence of acid, but the permissible concentration of acid is determined by the sour taste, and in the presence of pectin more acid can be employed without spoiling the flavour. The following formula from Campbell's book on canning may be of interest:

MAYONNAISE FORMULA.[3]

Salad oil	20 lb.
Egg yolk	2 ,,
100-grade pectin	1½ oz.
Sugar	4¾ ,,
Salt	4¾ ,,
Mustard	2½ ,,
Concentrated lemon juice ..	3 ,,
Water	14 ,,
Vinegar	20 ,,
Total	25 lb.

Pectin finds many other uses in the food industry. It is employed in place of gelatin in ice-cream whips and for thickening fruit syrups, such as are used for sundaes. It is also incorporated in soft fruit drinks, when the slight increase of viscosity will prevent the unsightly fruit pulp from floating to the top. Further, pectin will stabilise foam, and as such is useful in aerated beverages. There is every likelihood that further useful applications of pectin in the food industry will be found.

[1] [2] [3] *Courtesy of California Fruit Growers' Exchange Ltd.*

"Food Manufacture" Golf Prizewinners

THE FOOD MANUFACTURE Challenge Cup, announced in our last issue, was won at Long Ashton Golf Course on November 1 by Mr. D. Meacock (Richard Thomas and Co.) with a net score of 71. A similar score was returned by Mr. G. H. Dawkins (Publicity Films, Ltd.), but the tie was decided in Mr. Meacock's favour on the score over the last nine holes; Mr. Dawkins thus taking the second prize, the Eburite Cup, presented by Eburite Corrugated Containers, Ltd.

The special prize presented by Mr. T. W. Winterson (Wm. P. Hartley, Ltd.) for the next best score went to Captain T. S. Bradley (British Vegetable Parchment Mills, Ltd.) with a net 73.

A sweepstake, awarded to players not winning one of the above prizes, was divided between Mr. R. M. L. Francis (National Adhesives, Ltd.), Mr. C. W. Waylett (John Feaver, Ltd.) and Mr. H. S. Currie (Bowaters and Lloyds), who all returned scores of 74.

A remarkable round was played in the four-ball greensomes in the afternoon by Mr. C. Pretzlik, Jnr. (C. Pretzlik, Ltd.) and Mr. C. W. Waylett, who were 9 up on bogey. They thus won the prizes presented by Mr. L. Birkett (Jarman and Cowley, Ltd.). Runners-up were Mrs. E. H. Gasking (Batchelor's Peas, Ltd.) and Mr. Meacock, the morning's winner, who also put in a fine round, finishing 7 up.

The afternoon sweepstake was won by Mr. G. H. Dawkins and Mr. T. W. Winterson; the second prize in this going to Mr. Norman Gold (Eburite Corrugated Containers, Ltd.) and Mr. H. S. Currie.

Ideal weather, more like spring than November, helped to make this fifth meeting of the FOOD MANUFACTURE Golf Federation a success. There was a record entry, twenty-five players coming under the "starter's orders".

In addition to the prizewinners enumerated above, the following played: Messrs. M. W. Batchelor (Batchelor's Peas, Ltd.), G. D. Andrews (Joseph Farrow and Co.), L. Birkett (Jarman and Cowley, Ltd.), F. W. Wilkes (Harry Phipps, Ltd.), J. MacDowall (Batchelor's Peas, Ltd.), James Cornet (L. Sterne and Co., Ltd.), G. Maclean (Pickford's, Ltd.), W. Leonard Hill (Leonard Hill Limited), S. O. Saville (J. and J. Beaulah, Ltd.), J. W. Leno (L.C. Engineering Supplies, Ltd.), T. C. Sutcliffe (J. W. Sutcliffe and Co.), H. D. Leno (L.C. Engineering Supplies, Ltd.), H. G. Watkins (Dairy Industries, Ltd.), C. E. Brown (British Sales, Ltd.), and Arthur Chapman (British Sales, Ltd.).

MORE NEW FOOD BOOKS

THIS BOOK, which is the third volume of a work covering the whole range of foods, is devoted exclusively to those of animal origin.* Vol. I dealt with cereals, starch, oil seeds, nuts, oils and forage plants, and Vol. II with vegetables, legumes and fruits. The whole work will be finalised by the fourth volume, which is in preparation, and will deal with sugars, syrup, tea, coffee, spices, extracts, etc.

The present volume is divided into three parts, the first devoted solely to milk and its products. This is described by the authors as being "a book within a book".

The treatment is rather uneven. Pasteurisation is given three pages and a bit. Under "Fermented Milk" is given a short description of kumiss, kefir, yoghurt and lében, with their compositions, but no details are given of the nature of the ferments involved. Mention of the use of "acidophilus" milk is omitted.

Eggs occupy the 50 pages of Part II, and a lot of information is crammed into those pages. The cold storage of eggs is treated, as well as other methods of preparation, but no mention is made of gas storage.

Part III is devoted to meat, meat products, fish, fish products, poultry and shellfish, the introduction dealing with the various constituents found in them.

The tables of Allwater and Bryant giving the analyses of the different cuts of meat are given in the fresh meat section. The section on cured and smoked meats deals mainly with nitrates and nitrites. A good deal of the work quoted was done in the early stages of the investigations on the nature of curing, and this section could be tightened up considerably. Details as to the disappearance of nitrate and rapidity of reactions of nitrite are of little value, as they depend on conditions of pickle, temperature, etc.

Canned meats are treated somewhat cursorily. The tables of Bigelow *et al.* giving the analyses of various canned flesh products are included.

Under "Meat Extracts" it is said that "meat extract is commonly a by-product of the meat canning industry", which is correct. But to say that "the products from the liquors (of corned beef) contain a certain amount of common salt and commonly small amounts of sodium nitrate or nitrite or both, and perhaps sugar" is not correct.

Under "Fish Liver Oils" the references to vitamins are somewhat sparse.

The book is excellently produced and easy to consult. The table of contents at the beginning is a good feature, and allows the reader more readily "to find his way about". It should form a useful accessory to the food chemist's library, and brings the subject reasonably up to date.

T. C.-W.

* *The Structure and Composition of Foods. By A. L. Winton, Ph.D., and K. B. Winton, Ph.D. Vol. III. Pp. xxv + 524. 1937. 40s.*

Food and Health

It is with a feeling akin to despair that one opens a new book on nutrition, as these have been precipitated by printing presses in almost alarming numbers during the last year or so. It was in this mood, therefore, that we prepared to tackle the very latest arrival. Although it is a second edition, and therefore perhaps possessing a slight advantage in status over some of the newcomers, the fact that the first edition was published in 1928 makes it virtually a new publication.

Although of necessity containing the familiar facts about proteins, carbohydrates, fats, vitamins, and so on, this book is brought so much up to date, and is written in such an appealing way, that one can almost bring oneself to forgive the author for having added one more book on diet.

Interpolated among the various scientific considerations is some rather astonishing "debunking". For instance, we almost jumped when we read that recent experiments show that cooking soda, when added to green vegetables, does not affect the vitamin content, although perhaps it would be better not to disseminate this surprising reversal of a well-fixed idea, as most people use aluminium vessels these days. Mrs. Callow has certainly skimmed the cream from the very best of contemporary data on diet, and, moreover, has fitted it together with such skill and clarity that her work should be welcomed. For many purposes, the use of this book will obviate the necessity of referring to one or more of the larger tomes, and the present reviewer, for one, has put it in a handy place on his desk.

T. C.-W.

Food and Health. By A. Barbara Callow, M.A.(Cantab.), M.Sc.(Lond.), M.S.(Yale). Second Edition. 1938. *Pp.* 168.

Mostly Recipes

101 RECIPES FOR ENGLISH TOMATOES.

Prepared for the British Growers' Publicity Council by Helen Tress. Pp. 56. *Free.*

Excellent propaganda for English tomatoes. The recipes look good, especially the soups and savouries, but that is a matter of taste.

NATIONAL MARK CALENDAR OF COOKING.

Compiled for the Ministry of Agriculture by Ambrose Heath and D. D. Cottington Taylor. Free.

Recipes for each month of the year. The names of the authors are sufficient guarantee of reliability. National Mark products stipulated.

JANET BOND'S BOOK. A PRACTICAL GUIDE TO THE USE OF CANNED FOODS.

Canned Foods Advisory Bureau. Pp. 128. *Free.*

A new edition in a better cover. The inside as good as ever, with some interesting bulletins enclosed.

THE PHYSICIAN AND HIS DAILY BREAD.

Department of Nutrition. American Institute of Baking. Pp. 19. *Free.*

Nutritive data on bread, but mainly about weight reduction. Suggested menus for a week arranged to provide 1,500 cal. per day. Slimming released from terrors, especially for bread lovers.

THE RIGHT WAY TO RIGHT WEIGHT.

Pp. 16. *Free.*

By the same publishers as the preceding one, on the same lines, but copiously illustrated. Very good propaganda.

SUBTLE SEASONING.

Pp. 70. *Free on application. Lea and Perrins, Ltd.*

Recipes for all kinds of dishes, with, of course, the sauce in every one.

THE "EXPRESS" LIQUID CONTENTS RECKONER FOR ROUND CONTAINERS.

Gall and Inglis. 2*s.* 6*d. net.*

[*Concluded on page* 428

SYNTHETIC VITAMINS AT WELWYN

PERFECTION OF MODEL PLANT

WHILE DUE precautions must be taken in not over-estimating the advantages of supplying certain of the vitamins in the form of the synthetic product, or, to put it in another way, to under-estimate other food factors, there can be little doubt but that we are entering upon an era of re-adjustable foods. With the exception of vitamin D, a properly selected ordinary diet will provide all the vitamins, but the trouble is that, as has been amply demonstrated by the many studies of the past two or three years, there is a large percentage of people not getting enough food, much less a requisite amount of vitamins.

The canning of food has been exonerated from the imputation of destroying more vitamins than are lost in the ordinary routine of cooking. Indeed, by virtue of handling the foods in a fresher state than they usually arrive in the household, they contain even more. But with all this there still remains an appreciable percentage of loss in the case of the more unstable vitamins, among which figures vitamin C. The cooking water itself dissolves out a large percentage of this. Hence, canners, food manufacturers and others should be interested in becoming independent of these losses and in the possibility of making them up with the synthetic products.

Vitamins B_1 and C are being manufor the first time in Great Britain by Roche Products, Ltd., at their new factory at Welwyn Garden City, Herts.

The Factory

The new building, where production began early this year, is notable for its architectural design and perfect modern equipment. It is described as a masterpiece of Continental and British craftsmanship, and was designed by Professor Salvisberg, a Swiss architect of international repute.

Among its characteristics are panel heating in the concrete ceilings, ensuring an even temperature; ventilation of a most hygienic form, and windows which give a maximum access to light.

The new factory is a building of striking design and perfect modern equipment. This picture shows one of its architectural features, a staircase bay built of glass brick.

The main building houses the offices, warehouses and research laboratories. Original research has been a policy of the firm since its inception, and there are some 150 research workers in various parts of the world. New products are subjected to thorough pharmacological tests over considerable periods of time before they are placed on the market.

Adjoining the main building are the subsidiary departments, where tablet making and ampoule filling operations are conducted.

Synthetic Vitamins

The process factory occupies a separate building, and is of interest on account of its flexible structure, in which exposed steel frames are used. Here are manufactured the materials for the well-known "Allonal" and "Sedormid" tablets, and there may be seen the first and only plant for the manufacture of synthetic vitamins B_1 and C in this country.

Roche research chemists are experimenting on the practical application of these vitamins in the food industry.

Vitamin E is undergoing clinical tests, and may be placed on the market shortly.

Ascorbic acid (vitamin C) plant at the factory. This plant is the first and only one of its kind in the British Isles.

NEWS FROM THE INDUSTRY

Food in Cubes: Czech Inventor Plans British Production

Concentrated food cubes for use as emergency rations of the British Army are possible as the result of work by a Czechoslovakian inventor. The production of what he calls a "mass food article" is already a fact on the Continent in several countries. The German Army included this product in its standard rations, and millions of the cubes have already been consumed during the recent operations.

Patents have now been taken out to cover the new product and the inventor has hopes of interesting the War Office in his ideas.

Meanwhile he is anxious to make contact with a leading food manufacturing concern in this country which would have suitable equipment for the production of his cubes. The main necessity is for automatic cube-compressing machines. These should be capable of pressing cubes with the approximate proportions of $1\frac{3}{4}$ ins. by $1\frac{3}{4}$ ins. by $\frac{3}{4}$ in. The necessary filling height would be $2\frac{1}{5}$ ins.

The inventor is convinced that the primary use of his product would be by the military; but in these days of potential mass-evacuation and mass-feeding of the civilian population of large towns, it seems possible that such a product might well be utilised by the organisers of A.R.P.

There can be no doubt that the future of such a product, as a general emergency ration, would be very promising. No doubt more than one British firm will want to make further enquiries.

* * *

Canning Propaganda at Olympia

From November 2 to 26, during the run of the Woman's Fair at Olympia, an exhibit was shown which was a public recognition of the importance of canned foods. The organisers collaborated with Janet Bond's Canned Foods Advisory Bureau in presenting the exhibit which told the history of canning.

Called "The Triumph of Canning", the exhibit, starting from Appert, illustrated the evolution of the can, Pasteur, the Crimean War, the Great War, hand-made cans in 1926 to the mighty canning line with its hundreds of cans per minute of 1938. Veal in perfect condition which was taken from a can packed for Parry's expedition in 1824, and tripe canned in 1880 were displayed.

"The whole idea behind the food section, which is supported by such well-known firms as Aplin and Barrett, Heinz and Campbell's Soups, is demonstration and sampling." This comment of *Food Industries Weekly*, who covered the show fully, is an apt description of the exhibits of the fifty-odd food concerns who were at the Fair.

* * *

Miss Mary Gwynne Howell
Cooking reformer

Disastrous Herring Season

Twenty years ago herring fishing continued until Christmas; on November 8 the Herring Industry Board announced at Great Yarmouth that the gutting of herrings must cease by the next day. The curing of herrings, which constitutes 80 per cent. of the industry, has thus ended.

Fishermen especially have found this to be a particularly disastrous season. Herrings have been too small to satisfy foreign buyers and the average price at Yarmouth has been 18s. per cran as against 26s. 3d. last year. From September 1 to November 9 the value of fish landed at Yarmouth and Lowestoft was £238,000 lower than that of the same period last year. Many boats will finish the season in debt.

Calm weather resulting in a surfeit on the market has been one of the industry's problems. Due to this a succession of restrictions were imposed and during one week boats were fishing only on two days. Hope of a German demand for fresh herrings has encouraged some drifters to continue fishing.

The Rothamsted Fund: Royal Interest

Oldest agricultural experimental station in the world, Rothamsted will reach its centenary in 1943. To celebrate the occasion a Centenary Fund has been launched which intends raising £125,000.

The Duke of Kent presided over a meeting held in the Royal Society rooms at Burlington House, which launched the Fund. H.R.H. sketched the history of the station, which had its first success in the making of artificial fertilisers through the researches of Lawes and Gilbert. From the small quantities made in the Rothamsted barn, the output has increased so that now 41,000,000 tons were used annually by farmers throughout the world.

An indication of the interest of the King himself was given when the Duke announced that His Majesty, through the Duchy of Cornwall, had opened the Fund with a donation of £100.

Sir John Russell, Director of the Station, said the proposed chemical laboratory wing would cost £30,000, but of this the Ministry of Agriculture would provide £14,500. Emphasising the need for an endowment fund (an addition of £42,000 is required) he said that it might be asked why the Government did not provide the money. But, he said, if the Government did so, it would be in a position to dictate policy; a research station required an atmosphere of complete freedom.

* * *

Back to Beeton!

Newly formed National Home Cooking Association headed by Miss Mary Gwynne Howell, a dietitian and food consultant, is organising a National Home Cooking Campaign which aims at making cooking "fashionable" once more, in the Victorian tradition.

It is planned to hold inter-area cooking matches throughout the year, and when the winning teams have been reduced to semi-finalists there will be a contest held to decide who is "Britain's Best Cook".

The Association wants as members women who are interested in cookery, at a subscription of 2s. 6d. a year. Permanent food centres will be established throughout the country.

Organisers are being appointed to work in the London areas, starting with Ealing and Streatham. Principal food tradesmen's help is being enlisted; they are to be given posters

and leaflets to publicise the scheme. Help of the local paper is being secured to assist in the organising of a local Food Festival.

* * *

Former Lyons Publicity Man Joins I.B.C.

Mr. J. B. Cameron, chief of the newly formed publicity department of the International Broadcasting Company, was formerly in charge of the development of the advertising and publicity activities of the Metal Box Co., Ltd. Previously he was for three years with Mr. W. Buchanan-Taylor in the publicity department of J. Lyons and Co., Ltd.

* * *

Advertising the Advertiser

McDougall, Hartley, Cadbury, H.P. Sauce and other famous concerns will see advertisements which they have published in the *Radio Times* reproduced in an entirely new advertising campaign sponsored by the journal. Never before have advertisements which have appeared in the public press been reproduced in such a fashion. The idea behind the series is to show food manufacturers what their competitors are doing to publicise their products. Because of this the advertisements will appear in the food manufacturer's trade and technical papers. FOOD MANUFACTURE is one of the journals chosen to carry the announcements, and in the advertisement pages of this issue can be seen four examples of this novel series.

* * *

Sir Gilbert Morgan's Successor

The Lord President of the Council has appointed Dr. G. Stafford Whitby, at present Director of the Division of Chemistry, National Research Council, Canada, and formerly Professor of Chemistry at the McGill University, Montreal, to be Director of the Teddington Chemical Research Laboratory of the Department of Scientific and Industrial Research in succession to Sir Gilbert Morgan, F.R.S., who retired on September 30 last.

Dr. Whitby is expected to take up his duties early in 1939.

* * *

Change

E. T. Marler, maker of labelling glues for cans and bottles, is now a limited company and has had its address changed through the renaming of the street. Letters should now be addressed, E. T. Marler, Ltd., 14, Greville Street, London, E.C. 1.

THE "F.M." INDEX FOR 1938

FOOD MANUFACTURE'S annual index for 1938 is now ready. Readers who wish to bind their 12 copies and who will thus require an index are asked to write for a copy, which will, of course, be sent free of charge.

Sugar for Students

Thirty-four students from the Sheffield and Rotherham Grocers' Classes recently visited the Kelham Beet Sugar factory at Newark-on-Trent, one of the eighteen factories which comprise the British Sugar Corporation.

The party, under the leadership of Mr. C. H. Cherry, M.G.I., was received by Mr. A. A. Jones, commercial manager of the Kelham factory, and Mr. Mustill, representative of the British Sugar Corporation.

Kelham, a very compact and well-equipped factory situated in the midst of the beet-growing area, will be receiving, during the next three months, continual supplies of beets, both by road and rail.

On arrival the beets are temporarily stored in "silos" or "flumes", from where they are conveyed by water to the washing machines; samples having been taken from every load to ascertain the sugar content, and the percentage of "tops", if any. The sugar content of the beet around Kelham this year is well up to average, being 16·85 per cent. The beets delivered to Kelham are parsnip shape, and after washing they are sliced into "cossettes", from which the sugar is literally soaked in the series of batteries. These cossettes or "pulp", as they are now called, are dried and provide excellent food for sheep and cattle. The sugar syrup passes through many complicated processes to granulated sugar, being first mixed with lime, which is afterwards precipitated by carbon-dioxide. The thin juice is then concentrated to a thick syrup, which is crystallised in vacuum pans, and after passing through the centrifugal machines, pure white crystals emerge, which are dried in a granulator.

Beet sugar manufacture was described by Mr. A. A. Jones in a talk after tea.

* * *

Treatise on Bread

Makers of malt products, Edme, Ltd., have revised their booklet, *Commercial Bread*, which deals with modern bakery practice, and is "produced in the interests of better-bread-making". Consisting of 58 pages, this pocket-size booklet goes thoroughly into its subject. Nine pages deal exclusively with bread, and the publication then goes on to brown breads, novelty breads, Vienna breads and the theory and practice of steam glazing. Then buns, tea-cakes, rolls, etc., are discussed. Recipes are included.

The new and revised issue has been caused through a steady demand for the booklet which is availble from Edme.

* * *

Mass-Production of Sweet Yeast Goods

The production of sweet yeast goods, including sweet rolls and coffee cake, on a mass-production basis has challenged the ingenuity of bakers for some time. Bulletin 116 of the American Society of Bakery Engineers, released in September, was prepared by Stanley A. Kretchman, Elgin Food Company, Chicago, and describes the handling of sweet doughs by machine. There is a picture of a machine built by a baker from parts available from various manufacturers. The device is made from a dough sheeter, variable speed conveyor and cutters of various types. The advantages of making coffee cake and sweet dough in this manner are set forth and suggestions about the operation of a business of this kind are given.

* * *

pH Testing

Applicability to all measurements where other modes are practicable; applicability to pappy, slimy, doughy and other complicated systems; rapid measurement, up to about 3 minutes; cheapness compared with electrometric apparatus; compact portability with absence of solutions; small quantity of test sample needed. These are the claims advanced for the "Wulff" *p*H tester in a booklet available from H. E. Messmer, Ltd., suppliers of the apparatus. Special sections deal with the examination of foods and sugar, and examinations in the brewing industry.

* * *

Copper Plant

An ancient metal, copper, finds application in many modern factory installations. Leaflet from S. Briggs and Co., Ltd., of Burton, illustrates some of these applications. For the food industry, autoclaves, storage tanks, steam jacketed pans, vacuum pans and evaporating plant.

AUTOMATIC CONTROL for Food Factories by the PROPORTIONING SYSTEM

A discussion on this interesting form of Food Factory Control by J. J. FRASER

THE PROPORTIONING system of automatic control is an electro-mechanical method for securing modulation of motion utilising a standard alternating current supply circuit. It is free from the usual limitations of plain motorisation—in fact, is designed, in conjunction with a suitable controlling instrument, to give graduated action obtainable from some self-operating controllers within their very restricted mechanical power output and to fulfil all of the requirements of throttling modes of control approached by the conventional fluid-relay systems, but without the necessity of compressed air, steam, or hydraulic operation. Unlike mechanical methods, which require for every displacement of the actuated element the creation first of enough force to overcome the friction load before motion can occur, the proportioning system responds without time loss at full motor torque to the slightest change in condition at the controller. The makers claim that the proportioning system combines the advantages of mechanical and fluid-relay systems while eliminating hunting and other objectionable features.

Comparison

Comparing this system with electrically functioned ones commonly employed during the past—namely, those methods designated as two-, three-, or multi-position, the latter specification being given generally to any number of finite steps between three and six—we are informed that the proportioning system offers from five to ten times the sensitivity of the best of these. Additionally it permits the simultaneous solution of automatic control problems involving several variables, such as temperatures, pressures, and flow, simply through paralleling the corresponding primary control circuits, thereby gaining a resultant motion at the proportioning power unit. In cases where there is a tendency to deviate from the control temperature setting, due to large load changes, a means of compensation, in the form of a simple mechanism, can be added to avoid the wide under- and over-shooting of temperature which would otherwise occur owing to thermal lag variations.

Controlling instruments arranged for two-, three-, and multi-position modes of electrical control require the provision of a number of contacts, each of which must be wired to its mate in the power unit switching assembly. This introduces not only the necessity for frequent attention to contact conditions, but also to rather complicated circuits. With the proportioning system the same operating range or differential between the high- and low-control contacts of a two-position controlling instrument is spanned by a wound-wire potentiometer, the extremities of which are connected to two wires of the control circuit. A sliding contact is connected to the third wire, hence dividing the resistance into two arms. As this contact is moved over the resistance it varies the ratio of the two arms of the electrical transmission system, essentially a Wheatstone Bridge. Hence there is no waiting for the making of a high, low, or normal or some other finite control circuit before a reaction can occur at the motor-driven device. In reality it has been proved that the continuity of the control circuit of the proportioning system permits the utilisation of a wider operating differential than position control. This results in an earlier throttling of the valve opening, hence an appreciable saving of fuel when industrial or boiler furnaces are under regulation.

Certain valves lend themselves by virtue of their inherent flow characteristics to motorisation with proportioning power units, and have been employed with outstanding success in different processing industries. In proportioning control, the flow at all openings of the valve and the rate of change of flow are very important; when a proportioning motor-operated valve is being controlled it becomes an adjustable orifice regulated by the action of the controlling instrument in accordance with the process demands. Hence the selection of the proper valve, which is essentially one of controlling rate of flow, is of primary importance. Since the common fallacy is to over-valve the line when applying multi-position modes of control (in which event the results are no better than two-position operation), it is essential that any throttling mode should utilise a valve correctly engineered and preferably one providing an external means of capacity adjustment. By doing this the maximum orifice size can be set readily to suit the condition, without the necessity of removing the valve from the line and substituting a smaller one. There are valves which are capable of this flexibility, such as the V-ported, single-seated, or adjustable capacity globe type valves. Furthermore, gate valves, blast gates, and all forms of dampers find general usage.

In heat-treating practice the proportioning system not only regulates to the correct temperature, but also it inherently results in the development of uniform furnace conditions. Where an independent regulation of combustion efficiency is desired within an industrial furnace, the proportioning system employing furnace pressure or draught as the primary controlling factor finds an ideal adaptation in causing graduated movement of motorised vent dampers. It throttles the travel of a valve by a series of small increments, thereby saving fuel and preventing pressure surges in the line feeding a number of furnaces. Many operators of steel mills and other plants in the metal industry have chosen the proportioning system as their standard of automatic control.

In the field of automatic combustion control this system is serviceable because it requires only simple electrical connections and has the advantage of permitting remote control from various stations simultaneously. Likewise its popularity is evident in automatically regulating the pressure of gas in pipe lines distributing to consumers in metropolitan areas. Here leased telephone lines serve the telemetric needs in connecting the two wires (the third being grounded) of the pressure controller circuit to the remotely located station.

Application

This system has also been successfully applied to refining and other plants. It brings to industry a means of throttling the motion of apparatus through the medium of electricity, a practical guarantee of low equipment cost combined with negligible upkeep expense.

Under the control circuit designation there are both the proportioning and modutrol systems, the latter involving the same principle, but a smaller variety of power units designed for intermittent duty.

Fundamentally the apparatus of the proportioning system is a combination of two parts—namely, the electrical transmission system, incorporating the balancing relay, and the associated power unit, which can be adjacent to or remote from the controlling instrument. A mechanical interconnection is required between the power unit and the electrical balancing mechanism. The apparatus may be used in conjunction with practically all types of control instruments, such as temperature controllers, pressure, liquid level, and humidity controllers, flow meters and devices responding to changes in weight, position, etc. The energised apparatus or power unit is capable of being produced

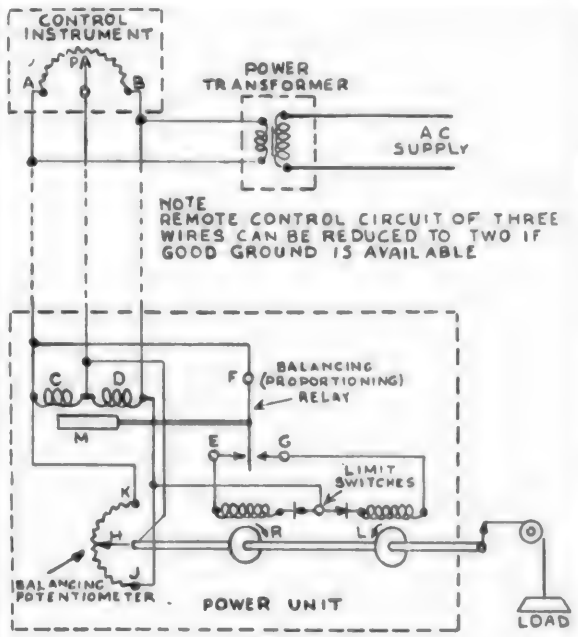

Fig. 1.

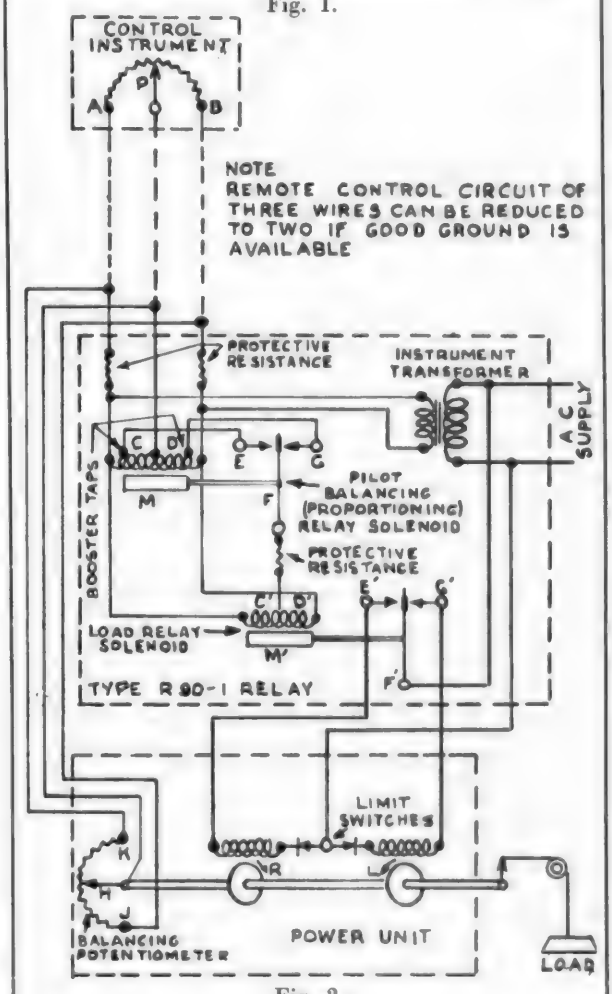

Fig. 2.

in almost any size from small, compact integral combinations of small motors and associated receiver mechanisms to units using powerful motors capable of operating heavy loads.

The balancing, commonly known as proportioning relay, consists of a movable armature M, mechanically connected to a contact blade F. This armature is positioned by the magnetic effect of the coils C and D, thus moving the blade F to contacts E or G. For the proportioning motors this relay serves as a pilot to a similar one that is mounted on the same panel to energise the motor circuit. To this panel also is attached the small transformer furnishing the control circuit with a.c. current of 20 volts. On the other hand, the modutrol motor which contains the relay within its housing is wound with 20-volt stators, hence a separate power transformer of a capacity sufficient to meet the needs of the control and motor input requirements is supplied.

Standard power units comprise reversing squirrel cage, shaded pole, induction motors. Adjustable limit switches govern the maximum angle through which the drive shaft of the power unit may travel. The balancing potentiometer JK, also associated with the power unit, is another wound-wire element over which the contact H is moved. The motion of this slide is governed by operation of the motors so that as the drive shaft rotates through the maximum displacement of the limit switches the contact traverses the entire balancing potentiometer.

Operation Described

To describe the operation, first assume that the sliding contacts in all units are in the centre position as shown in Fig. 1, which is a diagram of the circuits of the modutrol system, which includes the three separable elements—namely, control instrument, transformer, and power or motor unit, which houses the balancing relay. Under these conditions the resistances AP, PB, JH, and HK are all equal, and the current flowing in coil C is equivalent to that flowing in coil D. The armature M will then be acted on by equal magnetic forces from coils C and D, and the blade F will be held in the gap between contacts E and G. The motor units will be at rest with the armature M in what corresponds to the centre position. Any deflection of the controlling instrument will cause a variation in the ratio.

Assuming that this moves the blade P towards the extremity A, there will be an immediate unbalance in the electrical system, as the resistance AP will be less than PB. The net result is that more current will flow in the coil D than in coil C; armature M will then move under coil D, due to its increased magnetic effect, and the blade F will make contact at post G. With this circuit closed, the rotor marked L will be energised. As the power unit revolves, the sliding contact H will be moved towards the end of its resistance, marked J. When the increase in the resistance HK has overcome (balanced) the lowered resistance AP in the controller so that the effect of AP and HK is equal to that of PB and JH, the coils C and D again will exert equal influence on armature M. This will cause armature M to move to the central position, relay blade F breaking contact at G, and the power unit will stop. In the arrangement of apparatus for the proportioning system this relay mechanism acts as a guide or pilot to the load circuit, as shown in Fig. 2. In this second diagrammatic presentation the elements of the control system have been altered. Firstly, the power unit, which in the case of the proportioning system is a line voltage one, is entirely separate from the relay. Secondly, the relay unit contains in addition the balanced solenoids, a small instrument transformer that provides power for the low-voltage control circuit. Thus in the case of the proportioning system the three primary elements are the control instrument, the relay with its transformer, and the power unit.

It is evident that when the relay is in its central position the motor unit, in bringing it to that balance, has rotated an amount that is proportional to the deflection of the primary controlling device. From that achievement the proportioning system takes its name, defined as an equality of ratios. A very important feature in the operation of this system is that the reversing motor element within the power unit operates only when a change of position is demanded by the controller. This means that the demand for electrical energy occurs only when the apparatus is being repositioned, at which time the unit starts immediately in either direction with maximum torque available to move the driven device. Furthermore, the amount of corrective action transmitted by the power unit for a given deflection of the controlling instrument may be made as great or small as desired. Such relationships as these contribute to wide flexibility and justify the proclamation that the proportioning system is the answer to the universal need for an all-electric gradual throttling mode of control.

IN DEFENCE OF BRITISH BACON

"Picture not quite so gloomy." "Denmark . . . can teach us nothing."

To the Editor.

SIR,

While the bacon industry acknowledges the necessity for factory rationalisation and is at present engaged, under the terms of the Bacon Industry Act, in working out a scheme, the picture is not quite so gloomy as the one you paint (in your October issue) in comparing British with Danish conditions.

For instance, you cite the Danes' 84 factories with an average weekly throughput of 855 pigs and compare this with 622 British factories with an average throughput of 65 pigs.

It must be remembered that the Danish factory is an entity in itself, whilst many of our 600 "factories" are subsidiary to pork butchers or grocers doing a little curing for their own sales or as a sideline, because it is more economic to put hams into cure and to sell the loins as pork.

There are probably 80 to 90 (the same number as the Danes) bacon "factories" in the Danish sense. Many of them average as high an output as the Danish factories.

Your article states that every Danish farmer produces pigs, but it must be remembered that Danish agriculture is almost entirely dairy farming, to which pigs are a natural adjunct. In this country, probably three-quarters of the farmers raise pigs, and since the coming of the bacon scheme many have gone in for intensive pig rearing on a large scale, so that they make up for non-rearers.

I should like to see the evidence for the statement that Cornish pigs are sent to Yorkshire to be cured and back to Devon to be eaten. Less than half the bacon pigs go outside their own county to be cured, and less than a third go outside their province. Under the new Bacon Industry Act, the Boards have power to allocate pigs to the factories and to operate a transport pool, so that excessive transport can be checked to prevent pigs being sent unreasonable distances and wasteful overlapping can be eliminated or substantially reduced.

I think it is safe to prophesy that once the bacon scheme gets into its stride, as it has unfortunately not been able to do as yet, the progress in pig farming in this country will be rapid and the increase will be entirely directed at bacon production.

W. G. FRASER,
THE LONDON PRESS EXCHANGE, LTD.

LONDON, W.C. 2.

To the Editor.

SIR,

In your October issue you state that "the Bacon Development Board would be well advised to study carefully the bacon industry in Denmark before finally deciding on a new plan". I entirely disagree and can see no good purpose served, for the following reasons.

Our trouble is the production of pigs, not curing. England is unique in the whole world as far as food production is concerned, especially bacon. It consumes all it raises. Denmark is concerned purely with export of one particular style only, whilst this country has to supply the fresh pork market —which is a monopoly—in addition to the various cures. We have also to maintain the pedigree breeding herds for the world.

The British nation is most varied in its various local requirements of food, particularly of bacon. Local curers cure for local tastes and require different types of pigs, just as different types of animals are required for other meat foods.

Denmark's achievements have been much advertised and overrated. They can teach us nothing towards solving our problems. Our factories and knowledge are just as efficient as Denmark.

Whilst pork pigs in open market are selling to-day at 15s. to 18s. per score, how can you expect feeders to supply bacon factories at 12s. 6d.—the price permitted by bacon imports—whilst no imports are allowed of fresh pork?

The quota policy is all wrong, benefiting no one but the exporters and causing dear foods without any corresponding benefit to the producer.

Let the world yield what it can and balance the national books by the only known equaliser—tariffs.

J. B. PITCHFORD.

NEWPORT, MON.

The Secrets Behind Clear Beer

THAT clear sparkle which the British consumer demands in his beer was discussed at the Joint Meeting of the Institute of Brewing and the Incorporated Brewers' Guild on November 14 at the Horse Shoe Hotel, Tottenham. A large gathering of brewers and chemists took part in the meeting, under the chairmanship of Mr. A. F. Johnston.

Dr. Eric Helm, Head of the Research Laboratory, Carlsberg Brewery, Copenhagen, read a paper entitled "Non-Biological Turbidities in Beer". Dr. Helm enumerated a number of "hazes", but was mainly concerned with chill hazes, oxidation hazes and metal hazes.

Chill haze is a reversible haze and is due to the presence of a compound of protein and tannin. Oxidation haze, on the other hand, is a permanent one, and the precipitate contains 53 per cent. of protein.

Metal hazes are very troublesome owing to the fact that extraordinarily minute amounts of the metals cause turbidity. The author suggested that they are due to a combination of proteins and metals. Tin, copper and iron hazes have been studied. The small limits of tolerance to metals was demonstrated when it was said that the limits were 0·02 mg. of tin, 0·2 mg. of iron and 0·1 mg. of copper per litre of beer.

Mr. Watkins, Chairman of the Incorporated Brewers' Guild, in deprecating the necessity for the brewer to provide clear beers, said that the public would have them, and appeared to "drink with eyes and not palate". He mentioned that the problem of oxidation hazes had been alleviated to some extent by improvements in plant. He complimented Dr. Helm, as did the chairman, on the value of his paper.

After the meeting had been thrown open for discussion, a number of speakers raised points arising out of Dr. Helm's paper. Dr. Helm having replied, the meeting closed, when a good number of the company sat down to dinner together.

Book Reviews (*Concluded from page 422*)

Tables giving capacity of pipes, cylinders, tins, bottles, etc., showing capacity of containers in fluid measure and cubic inches. Should save much calculation, but it makes one pray for the introduction of the metric system.

THE "RAPID" PER DOZEN RECKONER

Gall and Inglis. 1s. 6d. *net.*

For those who buy or sell at the per dozen rate. Quarter dozens are shown up to 1 gross and others to 72 dozen, while the rates rise from 1d. per dozen to 20s., and others to 60s. per dozen or 5s. each. In this way most ordinary rates are covered.

INFORMATION and ADVICE

Beverage Froth—Mushroom for Meat Flavour—Farisian Essence—Peanut Butter—Horse-radish Creams—Coffee Extracts—Fruit Pulp in Lemon Cordial—Cheap Lemon Curd—Egg Yolk and White Separation—Table Creams—Macaroni—Pearl Barley.

Beverage Froth

3,753. *Please advise suitable ingredient to produce a foam or froth on beverage—viz., coffee or cocoa.* (Birmingham.)

Saponin is mentioned by Kingzett for this purpose, as follows: "When dissolved in water and agitated, it makes a frothy solution which is used as a foam producer in the preparation of beverages."

Mushroom for Meat Flavour

4,348. *We understand that near St. Didier, a jungle of oak trees in France, a type of mushroom is grown and that the mushroom is used in dishes to give them the taste of meat. May we ask you to tell us if this is available in liquid or powder form and from whom?* (Bombay.)

We have made extensive enquiries regarding this interesting product, but so far we have not been able to trace the manufacturers. We will let you know if and when the information is available.

Parisian Essence

4,566. *Can you let me have a recipe for the manufacture of Parisian essence, other than using burnt sugar colouring?* (Stourbridge.)

We regret we have no formula for Parisian essence. If you could give us some indication as to the flavour you wish to produce, we might be able to help you. We do not know the flavour under this particular name.

Peanut Butter

4,556. *I should be obliged if you could give me the name of a manufacturer of machinery for the preparation of peanut butter.* (Glasgow.)

The type of plant required for making the butter after the nuts have been toasted and skinned is a mincing machine. The type of mincer most suitable is that in which the nuts would be forced through one revolving and one stationary perforated steel disc.

Supplier of this was given.

Horse-Radish Creams

4,540. *Kindly give us a formula for making horse-radish creams, if possible by the cold process.* (London.)

Recipes for horse-radish cream vary according to the preference of the manufacturer. Generally speaking, the horse-radish should be dried and grated. There is no preservative used except vinegar. A certain amount of cornflour is used as thickener, and other ingredients are sugar, salt, condensed milk, flavouring spices, such as ground mace, and a stabilising agent. The cornflour is made into a paste with the vinegar.

Coffee Extracts

4526. *I am considering making fine qualities of coffee extracts for the better-class trade. My present equipment in this direction is only steam at 60 to 80 lb. and a copper steam pan. Could you give me the following details:* (1) *Plant required and process.* (2) *Choice between filter press and centrifugal.* (3) *Is sterilisation of the finished product necessary for keeping qualities?* (4) *Is there any danger of contamination with metals, such as copper, brass, steel and iron?* (5) *Any laws or regulations to be complied with.* (6) *What do you think of the financial venture?* (Burton-on-Trent.)

1. Firms were given who supply plant and containers for coffee essence.
2. A bag filter should be adequate unless you intend operating on a very large scale, when you would require a filter press.
3. Sterilisation is preferable.
4. There should be no danger of contamination from the metals you mention if you acquire the appropriate plant.
5. The product must conform to the Food and Drugs Act.
6. We cannot undertake to give financial advice.

Fruit Pulp in Lemon Cordial

4,469. *We have been making a still lemon cordial drink for some time, but we are not satisfied with the distribution of the fruit pulp in the bottled drink. The actual quantity of fruit pulp is in excess of that naturally present in the lemon juice, but after prolonged standing we find that it separates into two distinct layers—one of the lighter pulp on the surface of the syrup, and one of the heavier pulp at the bottom. The effect of this is that the intermediate layer of syrup, having no pulp, gives the impression that the drink is inferior to other competitive drinks, which are more homogeneous but which are, on analysis, inferior to our preparation. We wish to treat the pulp, or the syrup, in such a way that the pulp remains in suspension for a much longer period, and that when subsidence does take place the whole of the pulp sinks. This rapid separation of the pulp occurs in the glass, after dilution, as well as in the bottle. We have found that the specific gravity of our syrup is greater than competitive homogeneous drinks, so that lack of syrup density is evidently not the cause. Your suggestions and observations would be appreciated.* (Singapore.)

Without a clear idea of your manufacturing procedure it is impossible to give any specific instructions. The very fact that your syrup has a higher specific gravity than competitive products might possibly account for some of the trouble, the syrup being strong enough to

hold up the lighter fractions of the pulp. You might try a stabiliser, of which there are several types on the market, but those chiefly used are of the "vegetable gelatin" type and pectin. As there will be a certain amount of pectin in the lemon juice in your product, the addition of citrus pectin would be the most suitable, but there is no real objection to the other types of stabilisers. The vegetable gelatin would be added at the rate of 0·2 per cent. and would not materially affect the price. For particulars regarding the quantity of citrus pectin to be added, the manufacturers of this product would be able to help you. You should experiment with various stabilisers. The names of firms were given.

Cheap Lemon Curd

4,263. *We want a reliable formula for a cheap lemon curd which will not boil out when cooking.* (Leicester.)

Cheap Lemon Curd.

The following recipe and method of production will give you a cheap lemon curd such as is sold about 5½d. per pound:

Water	4 quarts
Cornflour	1¼ lb.
Flour	1 ,,
Rice flour	2 oz.
Lump sugar	10 lb.
Unsalted margarine	2 ,,
Eggs	6
Leaf gelatin	¼ lb.
Glucose	6 ,,
Butter essence	1 oz.
Egg yellow powder	½ ,,
Oil of lemon	2 ,,
Tartaric acid	2 ,,

Soak the gelatin in cold water for 1 hour. Boil the egg colour in 1 gill water. Dissolve the tartaric acid in 1 gill water. Mix the sifted flour, cornflour and rice flour in 3¾ quarts of water, and pass this mixture through a hair sieve into a copper bowl. Add the sugar, margarine and eggs to this, and beat up gently until boiling, stirring it well to prevent it from burning. After boiling for a few minutes add the gelatin, which should have been drained free from surplus water. Mix this gelatin well in and continue the boiling. Then add the glucose and bring again to the boil. Now the butter essence is mixed in, then the prepared egg yellow colour and oil of lemon. When all these ingredients are well amalgamated into the batch, take it from the fire and add the tartaric acid solution. Stir this well in and leave the mixing to cool (slightly stirring it occasionally) before transferring it to sterile jars. This mixing makes about 30 lb. of lemon curd. Care should be taken to follow the method as set out here and to stir well from the bottom to prevent burning if you have no steam boiler. Watch that it does not flow over the top of the bowl when the gelatin and glucose are added. Total time of boiling not to exceed 15 minutes.

Cheap Lemon Cheese.

Wheat flour	6 lb.
Maize flour	6 ,,
Water	2½ gal.

Mix well up and let stand overnight. Next day put in a steam pan:

Cold water	3 gal.
White sugar	60 lb.
Glucose	12 ,,

Boil up to 245° F., shut off steam and add flour and water well stirred up, and add 1 gallon of lemon juice and 6 well-whipped eggs, and 4 lb. of margarine. Stir well and bring to the boil, then add yellow colour to taste, simmer gently for 15 minutes. Pass through a fine hair sieve, and add 2½ oz. of essence of lemon. Stir well in and fill.

Egg Yolk and White Separation

4,507. *We are looking for a machine for separating the whites from the yolks of eggs, with a capacity of about 100 at a time, either hand or electrical power driven. Can you suggest a source of supply to us?* (London.)

We know of no machines for separating the yolk from the white of eggs. We believe that large concerns in this country requiring yolks and whites separated do this by hand. In some places the eggs are broken into a sieve, which allows the albumen to drain into a receptacle while retaining the yolk whole.

Table Creams

4,430. *Will you please let us have a recipe for table creams which only need the addition of one pint of boiling milk and no cooking?* (Birmingham.)

We regret that we have not a recipe for the particular product you ask for.

Macaroni

4,599. *We are desirous of establishing contact with a macaroni manufacturing firm, who would be in a position to make up batches for us, according to a specified formula.* (Herts.)

We regret that we do not know of any macaroni manufacturers who make to specifications from outside firms, but we think that any first-class firm of macaroni makers would be interested. The name of a firm was given.

Pearl Barley

4,617. *Will you please put me in touch with a machinery manufacturer who can supply me with a laboratory size machine for turning barley into pearl barley? The idea is to remove the husks from the barley and make them sound.* (India.)

The name of a firm was given.

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NEW COMPANIES

Authers' Confections (Sales), Ltd. (344841.) October 1. 4, Mill Street, Crediton, Devon. Confectioners' distributors. £750. Dirs.: H. Embery, Holloway House, Burrington, Devon; W. E. Short, Hill Crest, Burrington, Devon; A. E. Webber, 4, Mill Street, Crediton, Devon.

Chantecler Restaurant, Ltd. (345116.) October 10. Proprs. of cafés, restaurants, etc. £1,000. Dirs.: To be appointed by the subs.

Geego Milk Products, Ltd. (345329.) October 17. Dlrs. in and mnfrs. of milk, milk preparations, etc. £2,000. Dirs.: To be appointed by the subs.

Groot Constantia Wines, Ltd. (345494.) October 22. 89, Upper Thames Street, E.C. 4. Producers and sellers of fruit and the products of fruit; mnfrs. and distributors of wines, etc. £1,000. Dirs.: G. Beltrami, 22, Baxwell Road, Berkhamsted, Herts; A. Connell, Cranbrook, Marsh Lane, Mill Hill, London, N.W.

C. J. S. Hill and Son, Ltd. (345194.) October 13. Bakers and confectioners. £25,000. Dirs.: C. W. H. Hill, Romsey, Spicer Road, Exeter; A. S. Heywood, St. Catherine's, New North Road, Exeter; T. J. W. Templeman, Castle House, Exeter; C. Warren, Sunnyside, Honiton Road, Exeter; F. Wheaton, New Lodge, Salutary Mount, Exeter.

Intensive Crops, Ltd. (345008.) October 7. 66, Victoria Street, S.W. 1. Growers and producers of foodstuffs by intensive cultivation methods, etc. £1,000. Dirs.: E. H. Ward, Brown House, Devonshire Road, Harpenden; M. J. Tyssen, Glen Eagles, High Street, Harpenden.

Lincolnshire and Norfolk Dairies, Ltd. (345014.) October 7. Dlrs. in milk, butter, eggs, cheese, etc. £6,000. Permt. dirs.: J. J. Kershaw and Mrs. E. M. C. Kershaw, Milton Avenue, King's Lynn, Norfolk.

Pullins (Bakers), Ltd. (344817.) September 30. 28, Baldwin Street, Bristol. Bakers, etc. £5,000. Dirs.: T. G. Pullin, 26, Hill Road West, Clevedon, Somerset; L. W. Pullin, Elborough Estate, Yatton, Somerset; H. A. Hooper, 21, Beechwood Avenue, Hanham, Bristol.

John Rowntree and Sons, Ltd. (345205.) October 13. Grocers, provision dlrs., etc. £50,000. Dirs.: G. Rowntree, J.P., 55, Esplanade Road, Scarborough; C. J. Taylor, 5, Avenue Road, Scarborough; W. H. Robinson, 45, Garfield Road, Scarborough; M. Rowntree, Low Riseborough, Deepdale Avenue, Scarborough; B. W. Fincken, Rowan Wood, Broad Walk, Winchmore Hill, N. 21.

Shire Canneries, Ltd. (345024.) Mnfrs., canners, and bottlers of foodstuffs, etc. £1,000. Dirs.: E. H. Ward, Brown House, Devonshire Road, Harpenden, Herts; M. J. Tyssen, Glen Eagles, High Street, Harpenden.

Sussex Confections, Ltd. (344655.) September 26. Confectionery mnfrs. 37-39, Duke Road, Silverhill, St. Leonards-on-Sea. £1,000. Permt. dirs.: C. A. Woodroffe, Woodland Court, Collington Lane, Bexhill; G. H. Urquhart, Merrio Lands, Fairlight Cove, Hastings.

Swingburn, Ltd. (345214.) October 13. 9, Market Square, Witney, Oxon. Mnfg., wholesale, and retail confectioners and bakers, etc. £1,003. Permt. gov. dir.: H. R. Swingburn, 9, Market Square, Witney, Oxon.

George Thwaites (Arcade Halifax), Ltd. (344301.) September 14. 32, Clare Road, Halifax. Butter and provision mchts. £2,500. Dirs.: L. B. Thwaite, 23, North Park Road, Harrogate; Mrs. E. Thwaite.

S. J. Weston and Co., Ltd. (344820.) September 30. Mnfrs. of and dlrs. in confectionery, etc. £3,500. Dirs.: S. J. Weston, Beverley, 104, Cheltenham Road, Gloucester; G. O. Norris, Midgeley, Hempsted, Glos.; Miss H. J. O. Norris, 20, Podsmead Road, Glos.

The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.

TRADE MARKS

BENSPRAY.—600,165. **BENWHITE.**—600,166. **BENMIX.**—600,167. **BENTOR.**—600,168. **BENLITE.**—600,169. **BENRAY.**—600,171. **BENSWEET.**—600,237. **BENSHORT.**—600,238. **BENFOAM.**—600,241. **BENCLOUD.**—600,242. **BENRISE.**—600,651.—**All these trade marks appertain to different brands of edible oils and edible fats.** BENNINGA (MITCHAM), LTD., 33, Mortimer Road, Mitcham, Surrey. (Associated.) October 26.

BIRD'S EYE.—585,522. **Substances used as food or as ingredients in food, but not including spices.** GEORGE MORGAN LAIMBEER, 81, Troy Court, Kensington High Street, London, W. 8. October 19.

COQ D'OR.—586,907. **Chocolate.** MARK WHEATLEY JONES, 4, Norfolk Street, Manchester, 2. November 2.

CRYSTAL VALLEY.—600,717. **Butter.** TRENGROUSE AND NATHAN, LTD., 51 to 55, Tooley Street, London, S.E. 1. November 2.

DAIRY-DEW.—587,088. **Cheese and substances used for food containing cheese.** KRAFT CHEESE CO., LTD., Silverdale Road, Hayes, Middlesex. (Associated.) October 12.

FOREST GLEN.—600,172. **Tinned apples.** SCOTIAN GOLD PRODUCTS, LTD., Hospital Street, Middleton, Nova Scotia, Canada. (By Consent.) November 2.

L.S.M.—B 600,188. **Preparations for binding and flavouring sausage meat.** C. HERENDEEN AND CO., LTD., 4, Anson Place, Liverpool, 3. October 26.

MAXWELL HOUSE. — 586,281. **Coffee.** MAXWELL HOUSE PRODUCTS, LTD., 3510, Albert Street, City of Montreal, Canada. (Associated.) October 19.

Advertised before acceptance. Section 18 (1) (proviso).

ROBAT.—587,040. **Fish.** GEORGE TABOR, LTD., Imperial House, Pudding Lane, Billingsgate, London, E.C. 3. September 14.

RODEO.—600,650. **Margarine.** DIRECT DAIRY FARMERS, LTD., Australia House, 525, Strand, London, W.C. 2. November 2.

SEA BOUNTY.—600,034. **Sea fish (except live fish).** STIRK BROTHERS, LTD., 114, Flinton Street, Hull. October 19.

SUNBAR. — 600,675. **Fresh fruits and fresh vegetables.** B.U.F., LTD., 33, King William Street, London, E.C. 4. (Associated.) November 2.

TUSKER. — 600,981. **Tea, coffee, and cocoa.** WILLIAM WYLLIE, 67, Dundonald Road, Kilmarnock, Ayrshire. November 2.

TWINLINK.—585,693. **Flavourings (non-alcoholic) for food and beverages.** CUMMING, PARSONS, LTD., Top Lilley Street Works, St. Mary Street, Queen's Road, Manchester, 9. October 12.

VIOLIDE. — 587,173. **Greek currants.** THEODORE EYTHEMIOS KAZANTIS, Poseidonos Street, Vostizza, Greece. (By Consent.) November 2.

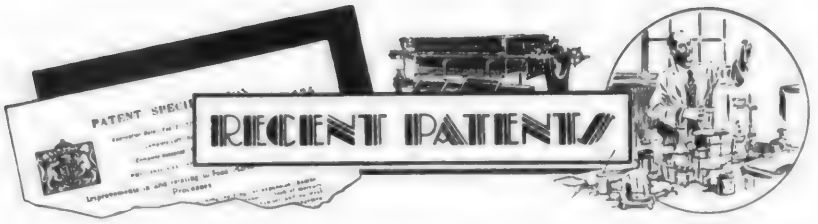
WESTRAL PRIDE. — 600,893. **Canned fruits and dried fruits.** STRATTON, SONS AND MEAD, LTD., 18, High Street, Melksham, Wiltshire. November 2.

B 584,213.—**Oranges.** THE AFRICAN RALTY TRUST, LTD., also trading as Zebediela Citrus Estates, New Palladium Buildings, 4, Fraser Street, Johannesburg, Transvaal, Union of South Africa. September 28.

User claimed from May 23, 1923.

585,523.—**Substances used as food or as ingredients in food, but not including spices.** GEORGE MORGAN LAIMBEER, 81, Troy Court, Kensington High Street, London, W. 8. October 19.

This list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).



Latest Patent Applications

31014. AKTIEBOLAGET SVENSKA FLAKTFABRIKEN: Apparatus for drying cheeses, etc. October 26.
30820. SALZBURG, A. A.: Production of dry starch products for the preparation of blancmanges, etc. October 25.
29935. POLLAK, A.: Bread conditioners. October 15.
29811. AKTIEBOLAGET SEPARATOR: Refining of vegetable, etc., products. October 14.
29719. ATLANTIC RESEARCH ASSOCIATES, INC.: Stabilised protein curd. October 13.
29501. FARKAS, A.: Preservation of fruits. October 12.
29086. ZOBUS, A.: Method, etc., for the production of mustard for eating. October 7.
29026. ROSENBERG, E.: Preparation of a cocoa-butter substitute. October 6.
28940. LEADBETTER, H., HIDER, G. P., and ELLIS, S. I.: Sheet metal containers for the packing, etc., of kippers, etc. October 6.

Complete Specifications Accepted

494,296. KING, W. C.: Packing of eggs or other articles for storage or transport.
493,103. DEHN, F. B. (FOOD DEVICES, INC.): Producing aerated expanded food products. (Convention date not granted.)

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

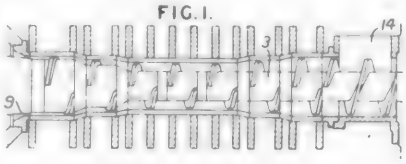
Abstracts of Recent Specifications

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 2s. each.

485,210. **Presses for separating liquids from solids.** KRUPP GRUSONWERKE AKT.-GES., F.
In a worm press for the treatment of moist material, such as oleiferous fruit, the diameters of the strainer and of the worm shaft 3 increase towards the outlet end 9, either gradually, or, as shown, in steps, the distance between the shaft and the inner surface of the strainer being decreased. The press chamber may be of greater diameter near the inlet hopper 14, tapering or decreasing in steps towards the central portion.

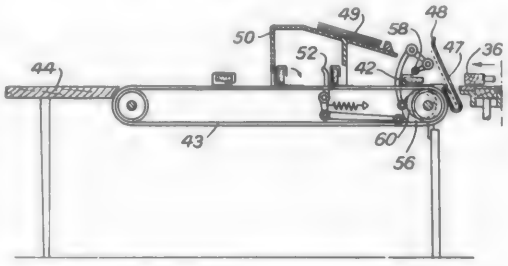
The worm shaft 3 may be hollow and provided with outlet apertures for the liquid. The wall of the press chamber may be perforated or formed of bars. At the transitional points where change occurs in the diameter of the chamber cams, tappets or blades may be provided to prevent the material under treatment from being carried round.

FIG. 1.



489,062. **Coffee preparations.** SOC. D'ÉTUDES ET APPLICATIONS INDUSTRIELLES.
A process for the manufacture of soluble dry products containing a concentrated coffee extract in a stable form consists in adding soluble, edible carbohydrates having the capacity of retaining the aromatic substances of the roasted coffee, to an infusion of roasted coffee in water, and drying by atomisation or spraying with heat. Thus malto-dextrine solution is added to a coffee infusion and the whole dried in a spray-desiccator. Other carbohydrates suitable are maltose and the product obtained by hydrolysing spent coffee grounds by hydrochloric acid.

488,126. **Wrapping-machines.** BENZ, J.
Apparatus for wrapping butter comprises a frame 48 having a window 47, through which moulded butter 42 is pushed by a scraper 36 so that the butter is wrapped on three sides by a paper sheet 49 disposed over the window. One edge of the paper is folded down by a reciprocating roller 58. The partially wrapped butter is fed on a conveyor 43 and is turned through a right angle by a finger 52, which is moved into its path. The butter



is finally enclosed by being turned through a further right angle by a depending wall 50, and is conveyed to a table 44, where the sides are folded, preferably by hand. The paper may be fed by hand from a pile of sheets disposed above the conveyor, or it may be fed from a roll and cut at the frame 48. The roller 58 and finger 52 are operated from cams 60, 56.

489,142. **Irradiating foods, medicines, etc.** ROST, H. F.
Antirachitic foods, medicines, etc., are prepared and/or sterilised by irradiating them in liquid form in thin sheets with ultra-violet rays of high intensity in the range 2600 to 3000 Å., rays of wave-length below 2600 Å. being completely or substantially eliminated. The irradiation is effected in the ordinary atmosphere, but with continuous change of air, and the duration of treatment is short—*e.g.*, 8 seconds or less. The substance may be treated in sheets of 0·1 mm. thickness in the form of a hollow cylinder or core; a suitable range of wave-lengths may be produced by means of a magnesium arc or by the use of a filter comprising a sheet of water, uviol glass, or a suitable synthetic resin. In the case of milk products such as butter, cheese, etc., the liquid milk may be irradiated before manufacture; solid substances such as yeast may be treated in aqueous suspension or in solution or dispersion in any suitable liquid. The invention is also applicable to the treatment of malted beverages, mineral waters, fruit juices, chocolate products, etc.

489,257. **Sugar processes.** WESTERN STATES MACHINE CO.
Charges of sugar grains and syrup are introduced successively into a centrifuge, which is accelerated after each charge to a high speed such as 1,250 r.p.m. for a 40-in. centrifuge within a period of 40 seconds, and the acceleration is continued until the centrifuge reaches a speed of 1,500 r.p.m. The charge is introduced at a temperature between 170° F. and 195° F. while the machine is rotating at a speed between 300 and 600 r.p.m., and the treatment eliminates more than 85 per cent. of the syrup before the full speed is reached. While the centrifuge is running at full speed the crystals are sprayed with washing water at a temperature between 150° F. and 195° F. Specifications 455,554 and 459,682 (Group II) are referred to.

489,957. **Preserving food.** ALLPORT, F.
In packing food in sealed containers an edible, water-containing, gelatinous lining is applied to the inner walls of the container before inserting the food, such that on heating, after sealing, the lining adheres to the food as a gelatinous glaze coating removable therewith. The lining consists of cereals such as farina or cornflour, animal substances such as gelatine or animal fat, a vegetable jelly-making substance such as algin, and water or milk, mixed together, heated, and cooled. The lining may be formed by slicing the mixture in solid form, or may be brushed on as a liquid or paste. An edible colouring substance may be included.

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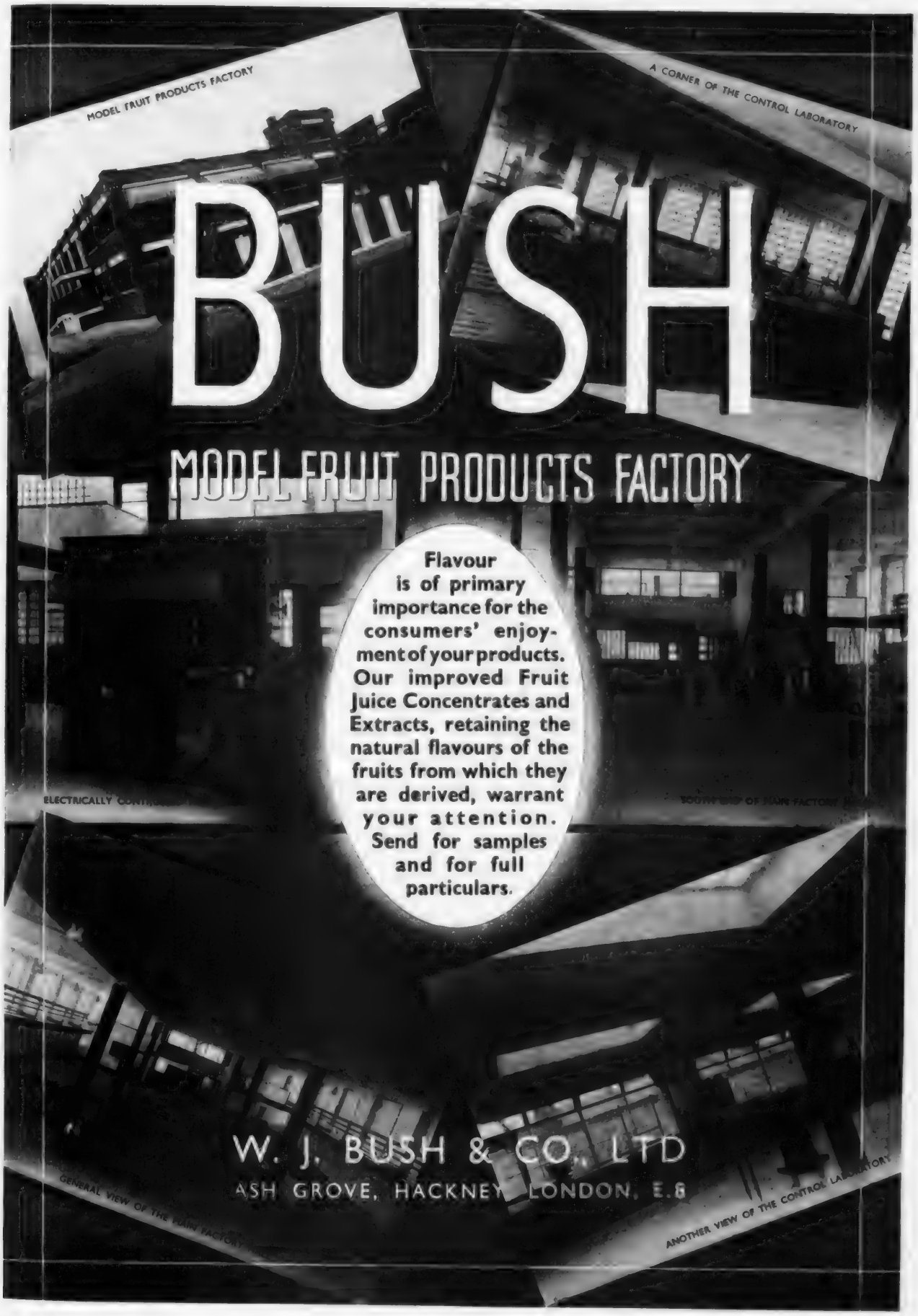
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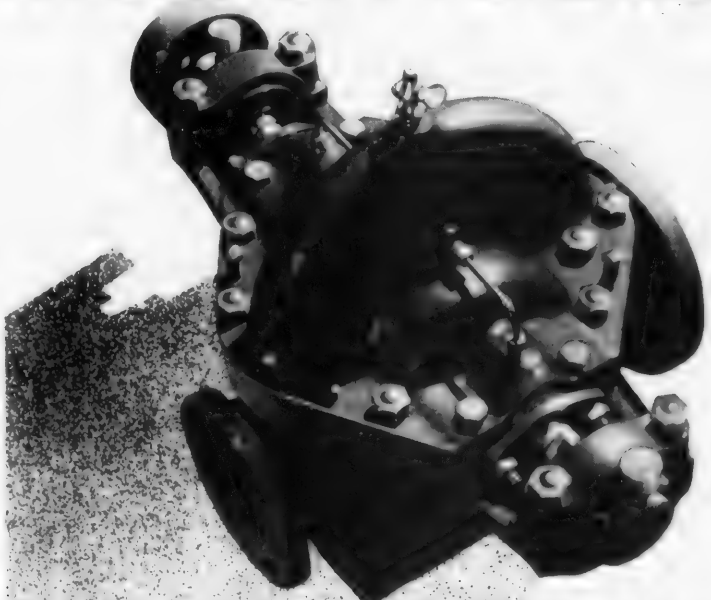

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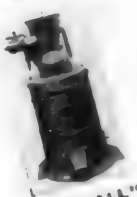

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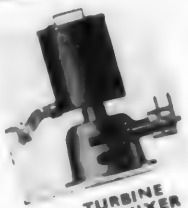

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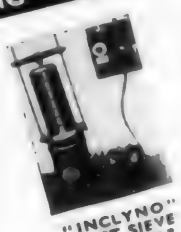

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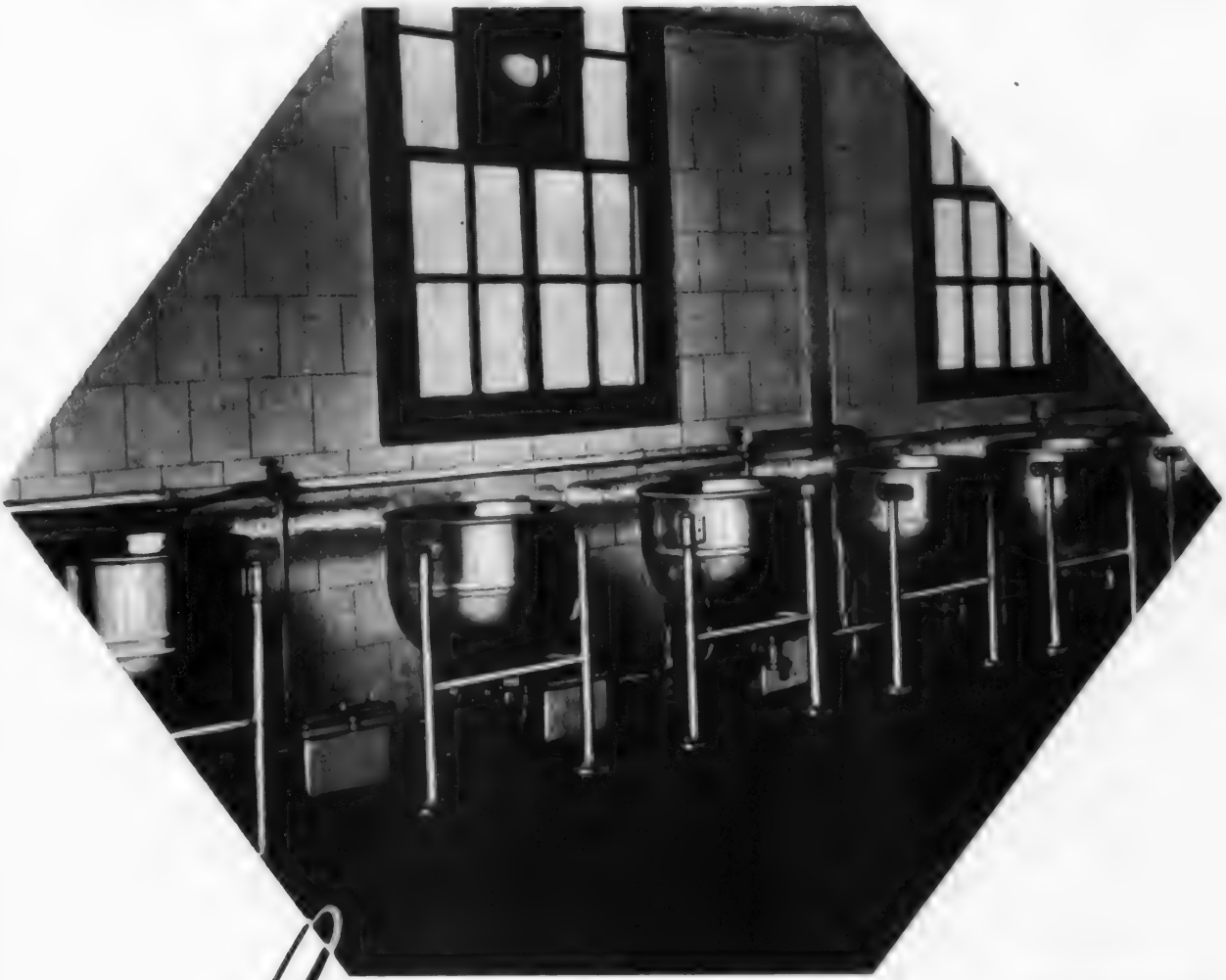

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PUFFED WHEAT
SHIRLEY ALWAYS brings home "Puffed" Wheat when she goes to the grocer's 'cause she loves its tasty, nutlike flavour. "Puffed" Wheat is the food that's "shot from guns." Every nourishing grain of wheat is actually exploded to eight times its normal size. That makes them specially easy to digest, so that you get their food energy more quickly and easily. Treat your family to a real Shirley Temple breakfast tomorrow! It's so convenient. Just pour it from the packet and serve.
'PUFFED' WHEAT
Dr. Toddles conducts the Toddlers' Chorus
Follow-On! Follow-On!
(to the tune of "Fare thee well")
Verse: Oh, I once knew a chap,
He was ten months old,
And a fine little chap was he;
He had Trufood first, then at nine months old
He had "Follow-On" regularlee!
Chorus: Follow on! Follow on!
Follow on, my Fairy Fays!
For if every chickabiddy wants to be a healthy biddy
He must follow on "Follow-On" ways.
Verse: A Trufood babe
Whom he's twelve months old
It contains — you should hear him coo!
He eats lots of things, but remember this:
He must have "Follow-On" too.
Chorus: Follow-On! Follow-On! etc.
The young man or young lady of nine or ten months can't have many "acquired tastes." That's why you get such long faces, such spluttenings, over so many cup-and-spoon feeds. But it is a worry to Mother. How can she be sure that her baby is getting all the important foods that he needs in that very important second year?
There is one way of making sure. Give baby Follow-On Trufood. When he's getting all the good things in Follow-On Trufood — milk, cream, bone-marrow, egg-lecithin, iron, all the necessary vitamins—you know he isn't missing anything. You know his diet can't be short of a single food necessary to build good bone, firm limbs and an alert brain.
It costs you nothing to try Follow-On Trufood. Just send the Coupon below for a generous trial sample. Then you will see how economical it is and how easily prepared.
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Seven times a week Rose's Marmalade and McDougall's advertisements are in front of the 3,000,000 families who read the RADIO TIMES

Lady Cynthia Slessor breakfasts among her books
HER VIEWS ON THE NEW LIME MARMALADE
SCENE: LADY CYNTHIA'S PRIVATE SANCTUM
"Good morning, Lady Cynthia. This is a charming, cozy room for breakfast, surrounded by your books."
"Sometimes I think I've almost too many of them — there are books all over the house, mostly biographies."
"I notice, however, that you've found a place on your table for the new Lime Marmalade."
"Oh, the Rose's, you mean. Isn't that rather different? There are millions and millions of books, but only one Lime Marmalade. When Rose's turns up, it claims its place by natural right."
WHERE LIME MARMALADE COMES FROM
Have you ever thought how much of your 'typical English breakfast' comes from the ends of the earth? Tea, for instance, and coffee and grapefruit? Your Lime Marmalade reaches you from the sunny West Indies, where Rose's own mile upon mile of fragrant lime groves.
The ripe fruit is plucked in the cool early morning to preserve that clean individual tang which tastes so satisfying on your breakfast toast
You get Rose's Lime Marmalade coarse or fine cut. A 1 lb. jar costs 10½d. and a 2 lb. jar costs 1/7d.
THE NEW BREAKFAST DISCOVERY
ROSE'S Lime Marmalade
Would you risk 2/2d FOR THE SAKE OF ONE HALFPENNY ?
LIVERPOOL HOUSEWIFE SAYS
'It pays to buy the best—it cuts out the risk of failure . . .'
BASED ON ACTUAL EXPERIENCE
When Mrs B . . . makes a Steak and Kidney Pudding, this is what it costs her — Stewing Steak 1/3, Kidney 6d, Shredded Suet 3½d., McDougall's Self-Raising Flour 1½d., her whole cost is 2/2d. And Mrs B 's Steak and Kidney Puddings have won fame in a wider circle than her own family — they are just perfect — the suet crust is light, delicious. Of course Mrs B always uses McDougall's Self-Raising Flour. 'I wouldn't risk a failure by using cheap flour,' says Mrs B , 'the little it will save me might be a big extravagance — I'm sure that things will turn out well with McDougall's and that is real economy.'
WHY McDOUGALL'S IS THE PERFECT BLEND
McDougall's Self-Raising Flour is milled from the finest . . . The raising ingredients are added with scientific . . . McDougall's never varies — every bagful and . . . bagful is exactly the same. Every batch . . . tried and tested by actual cooking . . . before it is ever sold to you. That is the reason . . . sure that every time you use McDougall's you . . . perfect results. That is why McDougall's cuts out . . .
Straight from office to home!
Grandmother was treated to . . . a good cook — it was her whole job. But modern girls go straight from an office to . . . with McDougall's, help are . . . turning out dishes every bit as good as grandmother used to make.
If you like any information or advice on any cookery . . . need only write to McDougalls Ltd., Millwall . . . E.14. Tel. East 1050). These cookery . . . Janet Johnston, will gladly answer all questions.
Mc Dougall's
the self-raising flour that never varies
COUPON—FOR FREE COOKERY BOOK
McDougalls publish, price 6d., a cookery book containing 140 recipes for cakes, . . . puddings, bread, scones, etc. A FREE . . . copy will be sent you in exchange for this . . . coupon filled in and posted in an unsealed . . . envelope (½d. stamp) to McDougalls Ltd., . . . Millwall Docks, London, E.14.

"Radio Times" advertisements do more than reach 3,000,000 of the nation's 12,000,000 homes—they stay in those homes for a whole week.

No wonder these products sell so well. Their names are in front of one in four of every customer on your books. Display these products prominently. Stock up well!

They're advertised in the RADIO TIMES JOURNAL OF THE BRITISH BROADCASTING CORPORATION *—display them*

The following products are regularly advertised in the "Radio Times"—more names appear on pages viii, ix, xi: BOVRIL, BENGER'S FOOD, BIRD'S CUSTARD, BIRD'S JELLIES, BOURN-VITA, BOURNVILLE COCOA, BROWN & POLSON'S CORN FLOUR, BULPITT & SONS LTD. (SWAN BRAND ELECTRICAL APPLIANCES),

Bourn-Vita, Homepride, H.P. Sauce are three more regular advertisers in the RADIO TIMES

History is made at night
HE LANDED THE ORDER THE NIGHT BEFORE HE WENT AFTER IT
'You'll be landing my job next!' said his sales-manager. But it was the 'deep sleep secret' that gave him such confidence and vitality—brought out the success-streak in him
Little cheese puffs
HOMEPRIDE
SELF-RAISING FLOUR
FREE COOKERY BOOK
Lunch at Seven!
HP
SAUCE
The World's Appetiser
BOURN-VITA to-night
makes to-morrow just right
9D PER ½ LB.
1/5 PER ½ LB.
MADE BY CADBURYS

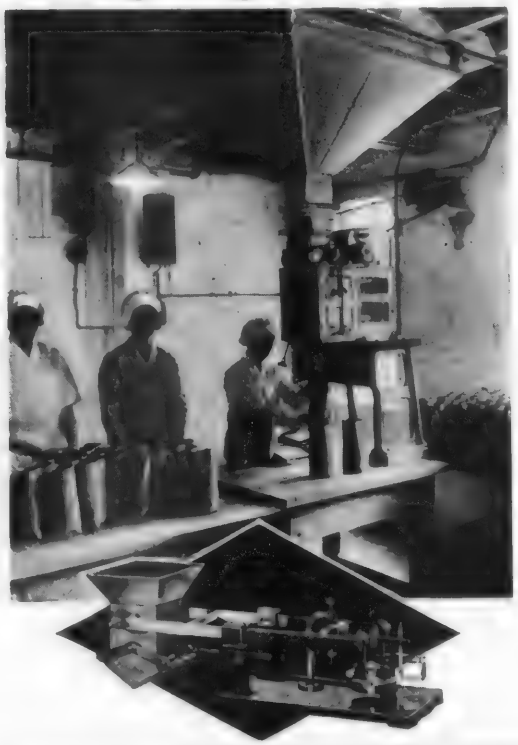
You won't find these goods "sticking" on your shelves. They are regularly advertised to one in four of the nation's families through the "Radio Times."

Every "Radio Times" advertisement is in front of three million families for a whole week. Trust "Radio Times" advertising to bring you business! Display these products prominently. Stock up well!

They're advertised in the **RADIO TIMES** JOURNAL OF THE BRITISH BROADCASTING CORPORATION *—display them*

The following products are regularly advertised in the "Radio Times"—more names appear on pages viii, ix, x: NATIONAL MARK PRODUCE, PEEK FREAN BISCUITS, QUAKER OATS, ROBINSON'S PATENT BARLEY, ROBINSON'S GROATS, SHIPPAM'S PASTES, SCOTT'S PORRIDGE OATS, SUN MAID RAISINS, VITA WEAT.

Weighing and Filling with Precision and Speed

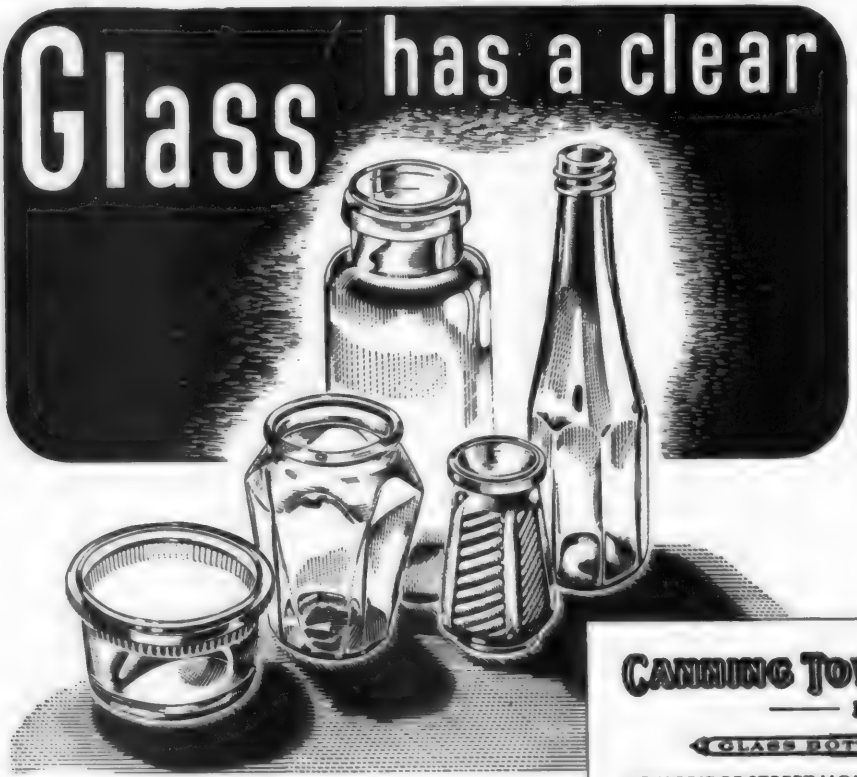


When profits are in the balance the question of accurate weighing and measuring is of vital importance. Our Weighing Machines discharge the exact quantities without loss of time, and not only obviate the possibility of complaints through underweight but avoid waste and overweight. We manufacture a full range of Automatic Weighing and Filling Machines for flour, custard powder, tea, sugar, cereals, cocoa, coffee, milk powder, medicinal powders, or any powdered or granular material packed in bags, cartons, tins, bottles, etc. Loose or tight packing, combined Conveying and Filling Plants. Our 25 years' experience is at your disposal to deal with your own problem.

AUTOMATIC WEIGHING
AND PACKING MACHINE COMPANY

22 CAROLINE STREET, BIRMINGHAM, 3
Grams: "Autopack, Birmingham." Proprietor: ARTHUR R. SMITH. Phone: Colmore 4082

Glass has a clear advantage



We are the leading manufacturers of Glass Containers for the FOOD INDUSTRY and can give you unequalled service

CANNING TOWN GLASS WORKS
LIMITED.
GLASS BOTTLE MANUFACTURERS

NEW BRIDGE STREET HOUSE, 30/34 NEW BRIDGE STREET, E.C.4
Telephone: CENtral 5342-5. Telegrams: "Dryad, Lud, London."
FACTORIES: CANNING TOWN, E.16, AND QUEENBOROUGH, KENT

The best the world produces goes to Zaandam

Ginger Root leaves his West Indian Home!

West Indian Ginger is the finest obtainable, and although this nobbly fellow is not as attractive to look at as some of his colleagues who assist in the making of Polak and Schwarz products, his rugged exterior conceals that delightful essential all-important to the preparation of Polak and Schwarz Ginger Essence.

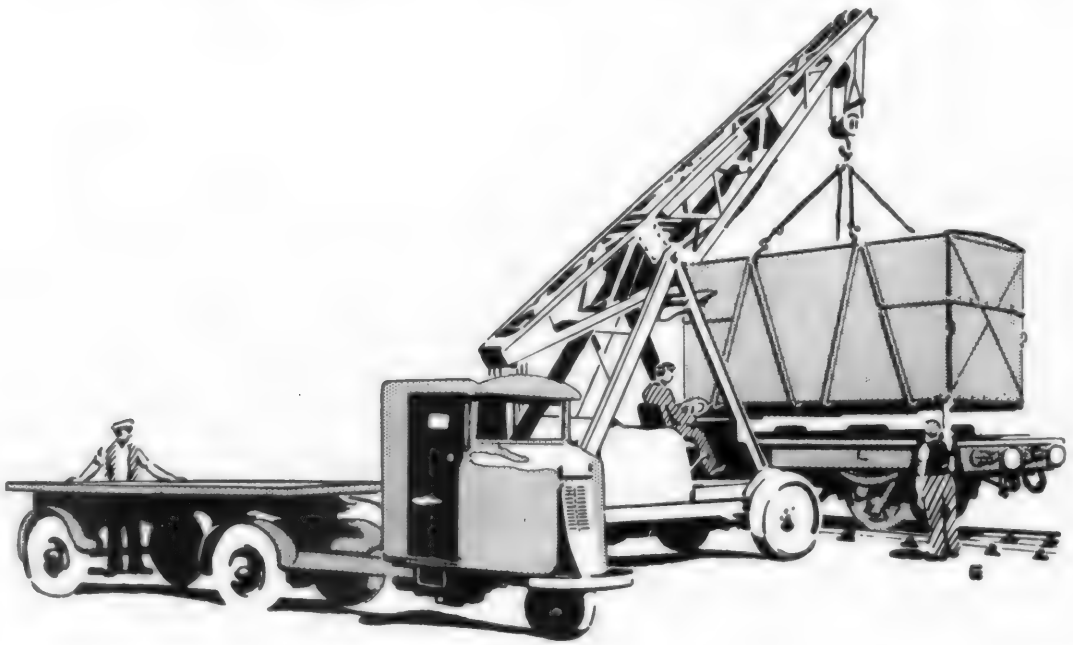
Polak & Schwarz

(ENGLAND), LIMITED

Manufacturers of Fine Essences and Extracts for the Food Industry

155 NEW NORTH ROAD, LONDON, N.1

IT SAVES
PACKING COSTS

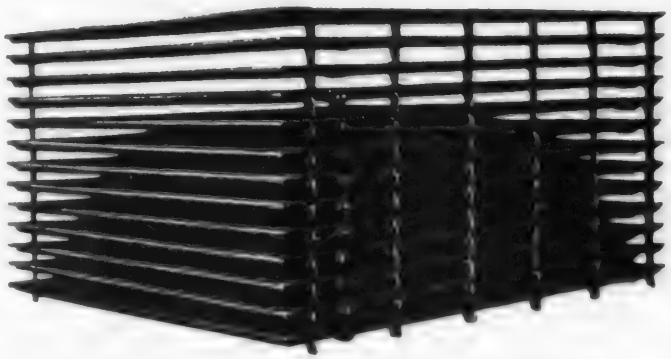


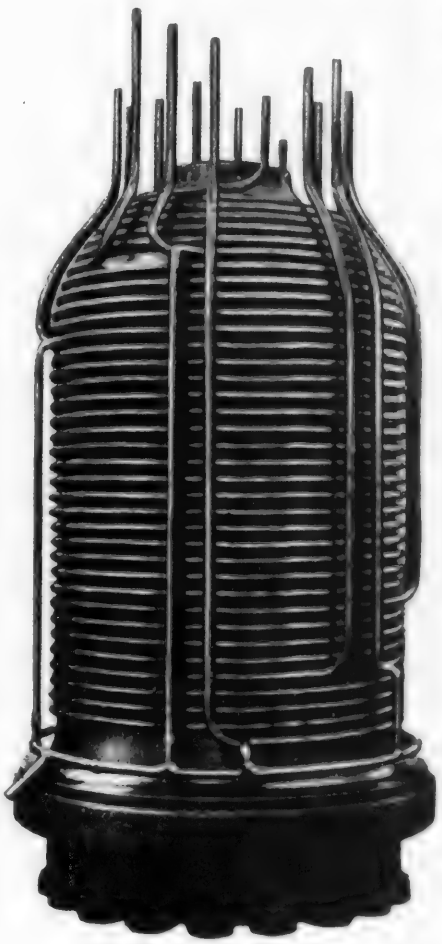
The British Railways' Road-Rail Container System is the most modern method of transporting merchandise. There are Railway Containers for almost every kind of goods. Containers ensure safe transit, quick door-to-door delivery, the elimination of the "returned empties" problem and a substantial saving in packing costs. Indeed, in some cases costs of packing material can be dispensed with altogether. Railway Containers are, in effect, demountable bodies of railway trucks. The sender can pack the goods at his own premises, and lock the Container; thus the merchandise is not disturbed in any way until received at the customer's door.

Telephone your nearest Railway Station or Depot now and take advantage of this better and cheaper means of transport.

G.W.R L M S L·N·E·R S.R

★ *Right:* One set of Drying Plates, steam pressure 90 lbs. per sq. in. Thickness of upper plate, 6 mm.; of bottom plate, 5 mm.





★

Above: Nickel Steel Forged Autoclave for internal pressure of 1,800 lbs./sq. in. Samka Piped externally for high-pressure water heating at 360° C.

"Samka" PIPING and DOUBLE WALLS

You are invited to investigate the special advantages of the SAMKA Heat Transferring Constructions for the manufacture of modern Apparatus. Both these methods — the Double Walls and the Pipes—permit the highest Steam pressures to be used, and are applicable to a wide range of modern materials. Write for full explanatory literature.

Henry Balfour & Co Ltd

DURIE FOUNDRY ✦ LEVEN FIFE.

LONDON OFFICE: ARTILLERY HOUSE, ARTILLERY ROW, S.W.1.

Specify "FIBERITE"

Thames Board Mills Ltd. Registered Trade Marks Nos. 465339 & 465340 (United Kingdom)

— the MADE in BRITAIN TINPLATE PACK

For full information write to:—

SOUTH WALES PATENT METAL BOX Co. LTD.

Hafod Isha Works,

SWANSEA, Glam.

Telephone No.: SWANSEA 2493

TINPLATES and BLACKPLATES

BRITISH MANUFACTURE THROUGHOUT

The Baldwin range includes a branded Tinplate for every purpose. These Tinplates are STANDARD brands regularly used in all parts of the world for every kind of canning and deep stamping work.

As the original makers of Open Hearth Siemens Basic Steel with complete control of materials from iron ore to finished product, Baldwins are able to offer exceptional advantages to users of Tinplate.

Strictly competitive prices for all grades and qualities quoted on request.

Prime Coke: "Kemys," "Snipe," "Nidum." Special Deep Stamping Coke: "King's Dock," "Karoo," "Galles." Best Coke: "Kama," "Robin," "Wern Crown." Charcoal: "Keblah," "Lark," "Clive." Best Charcoal: "Kaolin," "Jay." Best Best Charcoal: "Eagle." "Crayfish" Special.

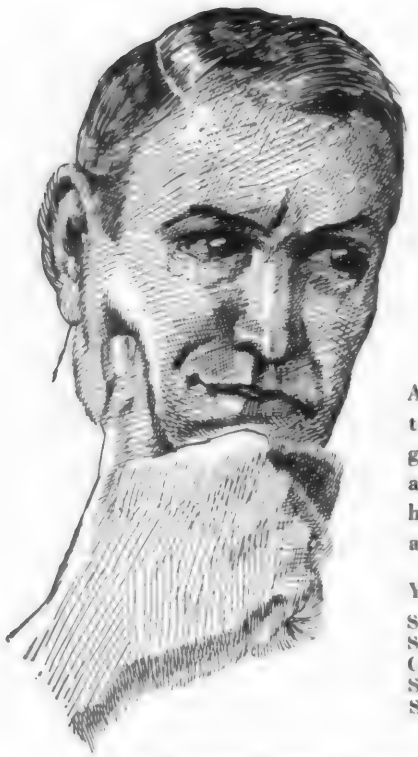
BALDWINS LIMITED

Registered and Head Office: P.O. Box 255, Shell-Mex House, Victoria Embankment, W.C.2
Telephone: Temple Bar 4433 (9 lines). 'Grams: "Balwinza, Rand, London." Cables: "Balwinza, London."

South Wales Branch and Collieries Office: 45 Wind Street, Swansea
'Phone: Swansea 4941 (8 lines). 'Grams: "Baldwins, Swansea."

London Sales Office: P.O. Box 286, Shell-Mex House, Strand, W.C.2
Telephone: Temple Bar 4433 (9 lines). 'Grams: "Promptitude, Rand, London." Cables: "Promptitude, London."

On Admiralty, War Office, Air Ministry, Board of Trade, Lloyds, British Corporation and other Lists.



The very best materials—yet it still lacks something!

Try **PROTEX** IN YOUR

As a base, incorporated in foodstuffs, Protex has been accepted as a standard ingredient by the leading food manufacturers and is valued chiefly for its power of enhancing the characteristic flavour of almost any food preparation.

YOU CAN ALSO USE IT TO IMPROVE YOUR

Soup Cubes	Cooked Meats—
Soup Powder	Brawn, Galantine, Pies, etc.
Canned Soup	Sausages
Sauce	Savoury Paste
Sandwich Spread	Savoury Biscuits
	Savoury Cheese, etc.

OUR RESEARCH LABORATORY OFFERS TECHNICAL HELP

FRED[K.] BOEHM Ltd., 17, Jewry Street, London, E.C.3

Telephone: Royal 5151 *Telegrams: Bissula. Telex. London*

If you CAN you SHOULD

Anti-acid, non-poisonous gold coating, preserves the rich, fresh colour and flavour of all fruits.

always use

ZINNATINE LACQUERS for FRUIT, VEGETABLES or FISH

Here are 3 Lacquers which provide perfect protection to canned packs—not only do they preserve the original colour of the contents, but also conserve the full natural flavour. No other lacquers so consistently safeguard your reputation for quality. Full details on request.

The sulphur-resisting ZINNATINE. Prevents those blackening stains in vegetable packs.

Preserves the fresh sea flavour of fish, and provides a lacquer film that will not fracture in the process of deep drawing.

All the BEST PACKERS COME TO US for their LACQUERS.

ARTHUR HOLDEN & SONS, LTD. BIRMINGHAM

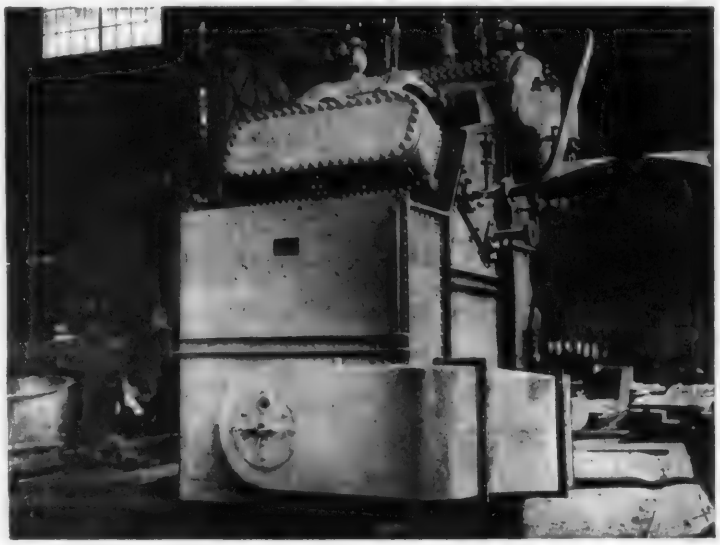
SAMPLE IT YOURSELF...
Don't risk spoiling the flavour or colour of the fruit in your jam—rely on ELPEX, the apple Pectin that never varies. We shall be pleased to send you a testing sample.
Elpex
PECTIN

FRASER BOILERS

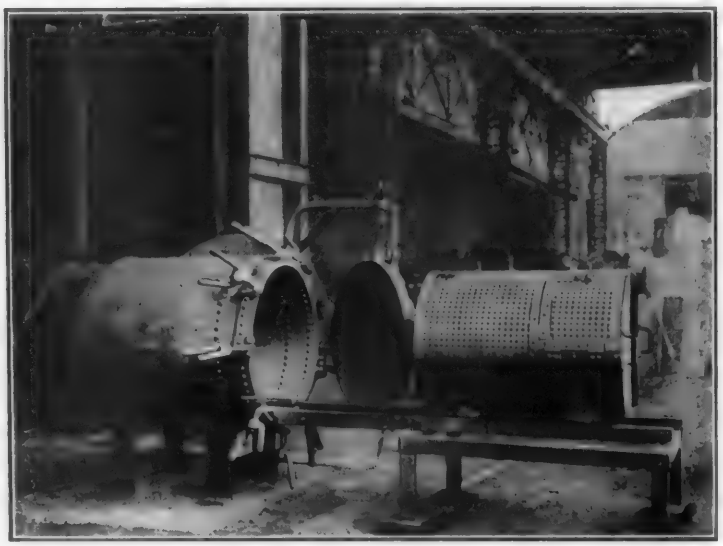
for FOOD MANUFACTURERS

FRASER HORIZONTAL DRUM WATER-TUBE BOILER

The illustration shows a Fraser Horizontal Drum type Water-tube Boiler with a capacity of 2,500 lbs. of steam per hour at 180 lbs. per sq. in. working pressure, and is of the high efficiency double-pass type. A Superheater is fitted giving a final temperature of 480° F. The boiler is oil fired, the burner being of the pressure type and is supplied by forced draught air at a temperature of 160° F. by means of tubular air heater in the waste gas outlet.



COOKING RETORTS



A number of pressure Cooking Retorts similar to the one illustrated have been designed and built by us for a well-known food manufacturer. The above retorts are 3′ 3″ dia. × 3′ 6″ long for a working pressure of 45 lbs. per sq. in. The perforated basket is arranged for easy and convenient loading and handling.

Please send for full particulars and copy of our Catalogue—ONLY ADDRESS :

FRASER & FRASER LTD.

BROMLEY-BY-BOW, E. 3

Phone : ADV 3266/7/8

DOVETAILING

Just as the carpenter's craftmanship

effects a faultless joint so co-operation in the manufacture of U.G.B. bottles and caps assures the highest standard of efficiency in both.

UGB BOTTLES & CLOSURES "Right by the Mike"

THE PERFECT PAIR

BOTTLES & CLOSURES

MANUFACTURED BY

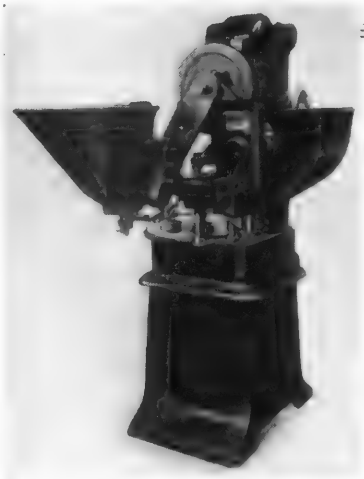
UNITED GLASS BOTTLE MANUFACTURERS LTD

THE LARGEST MANUFACTURERS OF GLASS BOTTLES IN EUROPE

Telephone: GERRARD 8611 (10 lines)

Telegrams: UNGLABOMAN LESQUARE, LONDON

8, LEICESTER STREET, W.C. 2

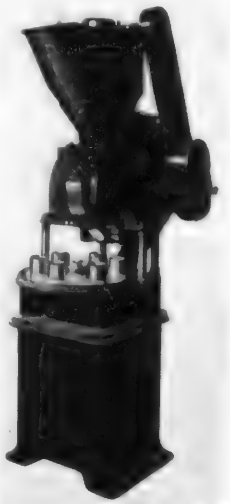


"O'MATIC"

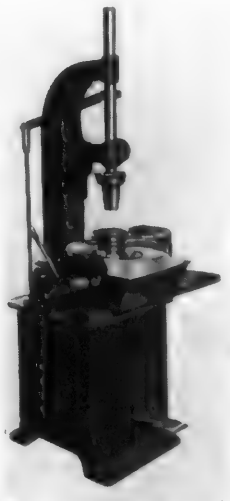
AUTOMATIC PIE PLANT FOR PIE TRADE

•

as supplied to all leading Pie Makers



"ZENITH"



"EXCEL"

FOR THE PRODUCTION OF PORK PIES, VEAL & HAM PIES, STEAK & KIDNEY PIES, ETC.

ALSO FOR CUSTARDS, TARTS WITH TWO FILLINGS, ETC.

Manufactured solely in Birmingham by

THE C. O. ERICSSON ENGINEERING WORKS LTD.

BIRMINGHAM FACTORY CENTRE, LIFFORD LANE, KINGS NORTON, BIRMINGHAM

Telegraphic Address: "Ericsson," Birmingham. Telephone No.: KINgs Norton 1141/2 (two lines).

2 years guarantee

is given with our Automatic Controllers, Dial and Recording Thermometers and Pressure Recorders; every instrument is British made and of guaranteed accuracy.

Remember that the selection of instruments is equally important as the choice of any of your plant.

NEGRETTI & ZAMBRA

38 Holborn Viaduct, London

Makers of the World's Best Instruments

BROADBENT

HIGH SPEED CENTRIFUGALS

FOR

DRYING, SEPARATING or FILTERING
ALL CLASSES of FOOD PRODUCTS

Used for

- FILTERING FROZEN EGGS
- MUSHING BREAD FOR SAUSAGES
- RECLAIMING CRYSTALS FROM LIQUOR
- DELIQUORING SEDIMENTS
- DRIED MILK, MILK SUGAR
- POTATO CRISPS, COFFEE ESSENCES
- FRUIT PULPS, MEDICATED WINES
- MEAT EXTRACTS AND JUICES

ABSOLUTE
UNIFORM EXTRACTION

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CLEAN
AND RAPID PROCESS

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CONTROL OF
MOISTURE CONTENT

PLEASE WRITE FOR
FULL PARTICULARS AND CATALOGUE No. 3936

THOMAS BROADBENT & SONS LIMITED

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CS PLANNED FACTORY

Every month, increasing numbers of Manufacturers are changing to CS PLANNED FACTORIES. These scientifically designed buildings, like the one shown above that we recently erected for Messrs. John Bell, Hills and Lucas Ltd., the Manufacturing Chemists, are as much a part of the manufacturing process as the plant within them. Production facilities are planned to the last inch, making possible new high speeds of output and reducing overheads to a minimum. The Complete Service that goes with CS Factories takes care of all those complicated details connected with site selection and dealings with local authorities. If you are considering changing to new premises, you, too, might find CS ideas helpful ; building suggestions and estimates will gladly be submitted without obligation.

CS FACTORIES *planned for modern industry*

COMMERCIAL STRUCTURES LTD.

CONTRACTORS AND ENGINEERS, STAFFA ROAD, LEA BRIDGE ROAD, LEYTON, E.10 *Leytonstone 3678*

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Manufactures cover all Pure Air Requirements

Components or complete installations

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AIR FILTRATION — A.R.P. PURE AIR FOR PROCESSES

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VENTILATION — Centrifugal and Propeller Fans

WINTER & SUMMER AIR CONDITIONING

BOILER HOUSE FAN SYSTEMS

Automatically controlled AIR CONDITIONER for food factory

AIR CONTROL INSTALLATIONS LIMITED
RUISLIP • MIDDLESEX

TELEGRAMS: CONTROLAIR, RUISLIP

TELEPHONE: RUISLIP 4066 (P.B.E.)

. . . OUR USAGE IS DECIDEDLY ROUGH . . .

. . . but we've not had the slightest trouble with it," said a customer of ours. Another remarked, " . . . it seems impossible to wear it out." He'd been trying for fifteen years, so he should know!

Maybe such reliability is a bit out of date but the efficiency of Gardner machines is almost futuristic.

The Gardner Patent "RAPID" Sifter and Mixer will perfectly distribute an ounce throughout hundredweights of other ingredients with surprising rapidity. . . . "Mixing was nearing completion after *one minute*." . . . "in three hours the Mixer mixed the same amount of material as took six to seven hours by previous methods."

As to economy . . . "the power cost averaged 1½d. per mixing and even that will probably be improved upon."

Why not ask us about the

GARDNER

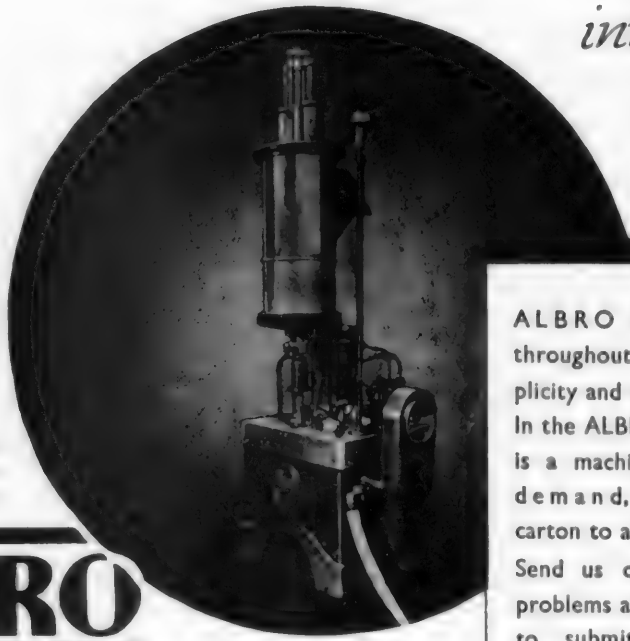
Patent 'Rapid' SIFTER & MIXER

OR OTHER GARDNER PLANT FOR THE FOOD MANUFACTURER

WM. GARDNER & SONS (GLOUCESTER) LTD.
BRISTOL ROAD, GLOUCESTER.
Telephone: 2288 *Telegrams: "Gardner, Gloucester"*

LONDON:
19, Gray's Inn Chambers, 20, High Holborn, W.C. 1
Telephone: Chancery 7347

They fill anything into everything



Vacuum-operated filling machine for mincemeat

ALBRO FILLERS & ENGINEERING CO. LTD. ALL BRITISH

ALBRO fillers are renowned throughout the Trade for simplicity and economy of operation. In the ALBRO range of 94 models is a machine to meet every demand, from filling a small carton to a large jar.

Send us details of your filling problems and we shall be pleased to submit suggestions to overcome them.

51

NORTHAMPTON WORKS, WATSON'S ROAD, WOOD GREEN, LONDON, N.22

Telephones: Bowes Park 2217-2218

AIR is an ingredient!

What quality do you use?

The air in your factory can constitute an important ingredient of your food product. If the atmosphere contains impurities, they will be absorbed as surely as if you had deliberately included them as part of the recipe, and in consequence your product loses its purity and capacity to "keep."

OZONAIR System of Pure Air Ventilation eliminates this danger, ensuring and maintaining the absolute purity of your foodstuffs.

The OZONAIR System has been successfully installed by the following:

Flour Millers
Biscuit Manufacturers
Confectionery Manufacturers
Chocolate Manufacturers
Jelly Manufacturers
Meat Pie Manufacturers
Sausage Manufacturers
Cooked Meat Manufacturers
Suet Manufacturers
Restaurants
Kitchens
Refrigerating Stores
Holds of Ships
Abattoirs
Breweries

OZONAIR

Pure Air Ventilation

Remember 1st July and the Factory Act

Send for full particulars to DEPT. 21

OZONAIR LTD., Ozonair House, Longmoore St., London, S.W.1

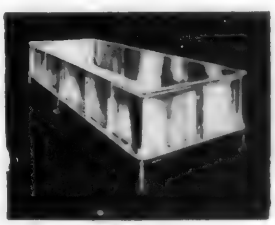
HOPKINS
STAINLESS STEEL SPECIALISTS

HOPKINS manipulate "Staybrite" ✱ Stainless Steel for all Food Manufacturer's requirements.

In this Industry, where the clean and sterile conditions of all products used are of paramount importance, Hopkins Stainless Steel Equipment should be used throughout.

The design of Hopkins "Staybrite" ✱ Stainless Steel Products are in the hands of skilled engineers and metallurgists familiar with the particular requirements of the Food Manufactory.

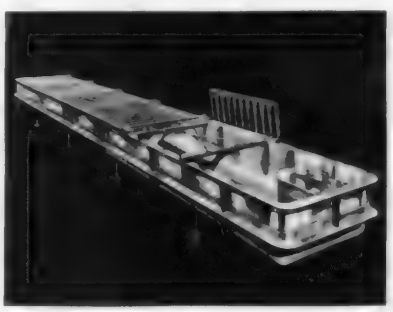
Send for our new Stainless Steel Brochure

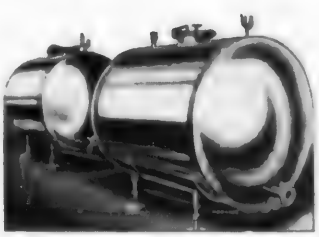


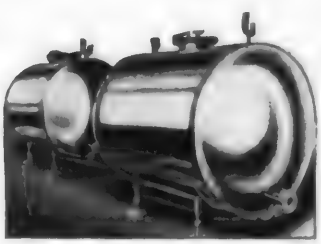
G. HOPKINS & SONS, LTD.

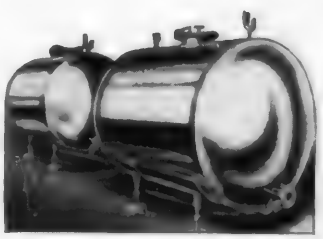
40-52, HOLLOWAY RD., LONDON, N. 7

'Phone : NORth 3801 (5 lines).
Grams : "Seamanlike, Phone, London."

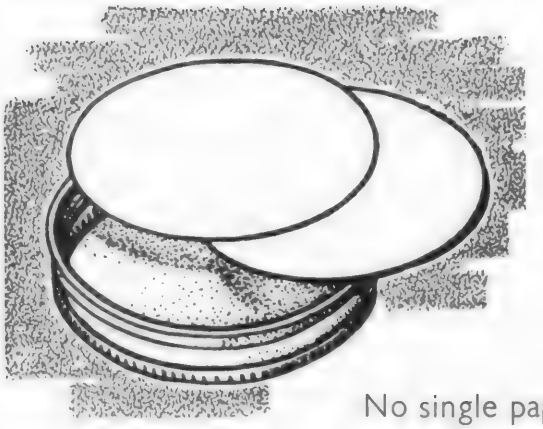








✱ "Staybrite" Steel—A product of FIRTH-VICKERS Stainless Steels, Ltd.



THE

MONO LINER

MAKES A COMPLETE CLOSURE

If you have been having trouble with inefficient closure of your marketed goods, do not blame the cap. What about the Liner Paper?

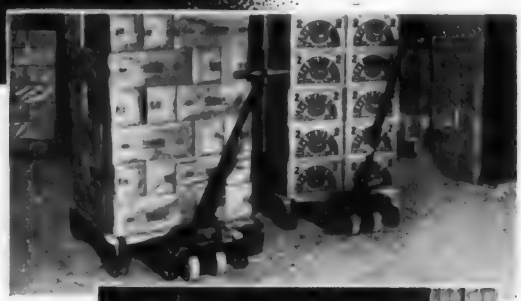
No single paper is a cure-all; what is suitable for one product may be utterly inadequate for another. Therefore a Liner Paper manufactured to meet specific individual conditions is often more than advisable.

OUR RESEARCH ORGANISATION, OUR MODERN FACILITIES FOR TURNING OUT PAPERS EXACTLY SUITED TO DEFINITE NEEDS—THESE ARE AT YOUR SERVICE ECONOMICALLY.

MONO CONTAINERS

WRITE PARTICULARS OF YOUR REQUIREMENTS TO MONO CONTAINERS LTD., PARK ROYAL, N.W.10. WILLESDEN 0900 (8 LINES)

MOVE GOODS QUICKLY, EASILY
—with less risk of damage



Whether goods are bulky or heavy, awkward or fragile, they can be moved speedily and cheaply, and stored in the minimum of space with YALE Hand Lift Trucks.

Available for capacities of 1,000 to 5,000 lbs. with Skid Platforms. Every YALE Truck is sturdily built, resulting in low maintenance costs; easily operated in confined spaces; the load is always under full control of the operator.

Let a Yale Engineer investigate your trucking problem.

The model illustrated has single stroke lift, 45° side lift. Balanced handle and hydraulic check. Positive hook latch. Ball bearings. Grease-gun lubrication.

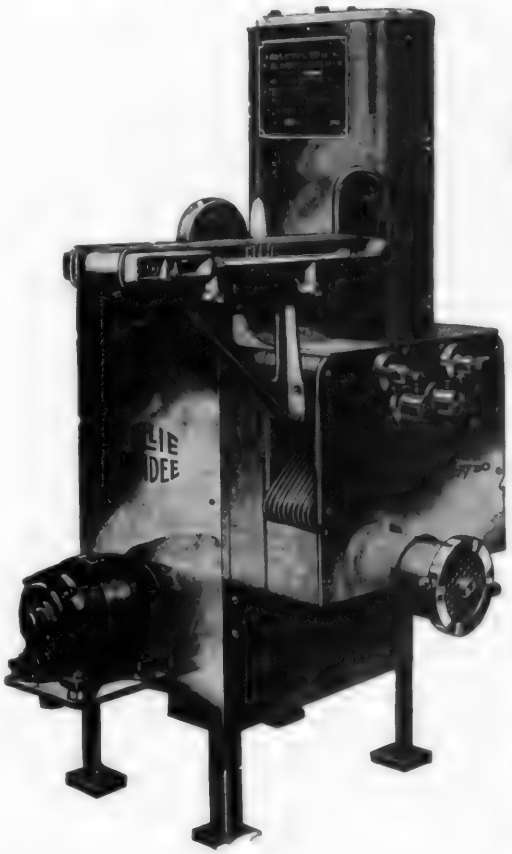
TRADE YALE MARK
HAND LIFT TRUCKS

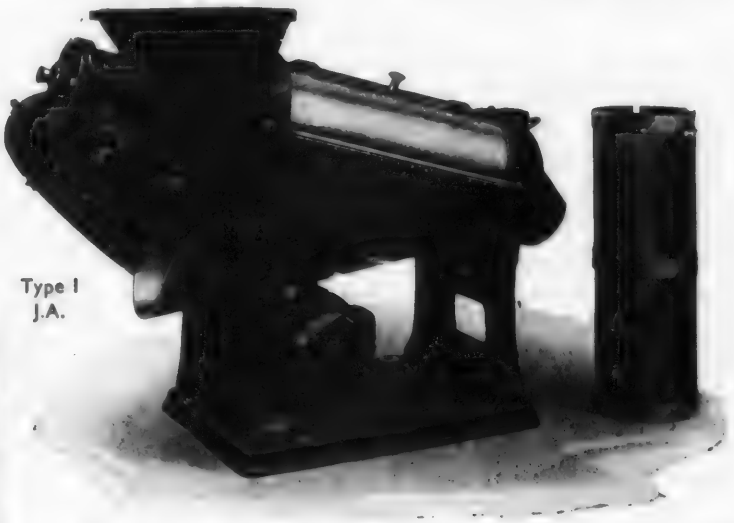
YALE *'RED STREAK'* MODEL (Capacity 3,500 lbs.)

THE YALE & TOWNE MANUFACTURING CO.
A Company with limited liability Incorporated in U.S.A.
WILLENHALL & WEDNESFIELD, STAFFS.

RB HL2

"KELLIE" Machines for Marmalade





Type I
J.A.

Above: Pulping, Straining and Separating Machine, Type I J.A., for pulping tomatoes, oranges, apples and stone fruits generally. Can be supplied in Stainless Steel, Pure Nickel, Monel Metal, Copper and Aluminium.

Left: Quartering, Peeling, Separating and Pulping Machine for oranges, lemons, tangerines, grape fruit, etc. Output 60 fruits per minute. NO grading required.

Have **you** *got our latest illustrated brochure relating to the KELLIE-YATES Filtration Process and Plant for the scientific and economic production of Jams, Jellies and Marmalades?*

Patent Automatic Filling Machine, Type 4 F.P., motor-driven, for jams, jellies, and marmalades. More accurate and cleaner filling than has ever been possible before. Patent micrometer adjustment ensures instant setting without stopping the machine.

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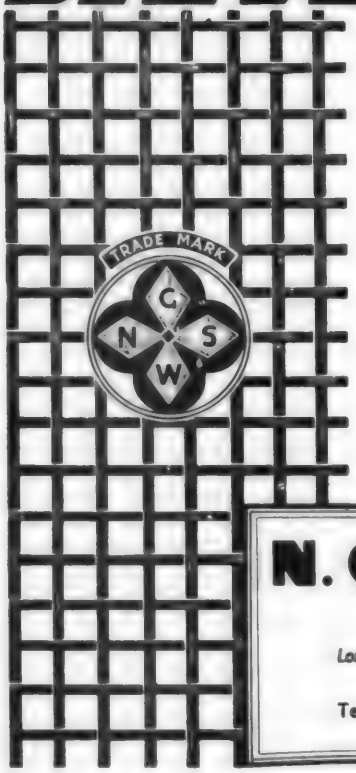

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The "Unishell" Seal Patented

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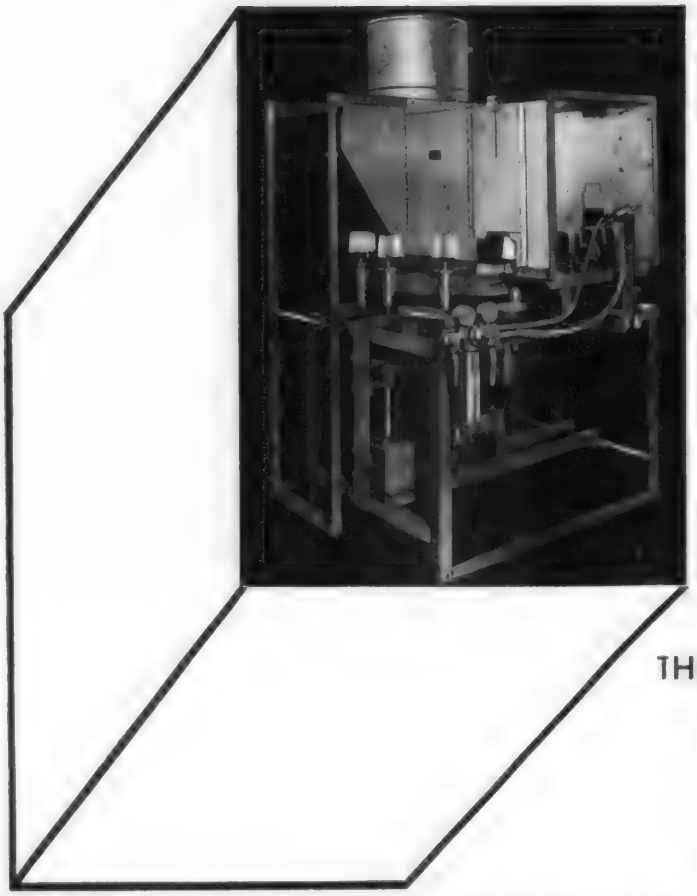

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CVS—161

Aniline Printing

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GRAMS THRISSELL PHONE BRISTOL
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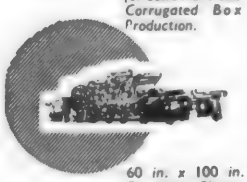
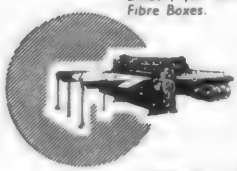
PRIVATE BRANCH EXCHANGE

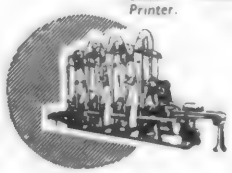
96 in. x 53 in. Printer - Bender, for Solid Fibre and Corrugated Box Production.



60 in. x 100 in. Two-Way Slitter-Binder, for Solid Fibre Boxes.



" Thrissell " 3-colour Gravure Printer.



THIS " Thrissell " Aniline printer can be supplied with three or four Printing Heads and a Rewinder. It is equally suitable for long or short runs of high-class wrapping materials.

It can be iinked up with Direct Letterpress, Gravure, Bronzing, and other Thrissell units, and equipped with sheet delivery.

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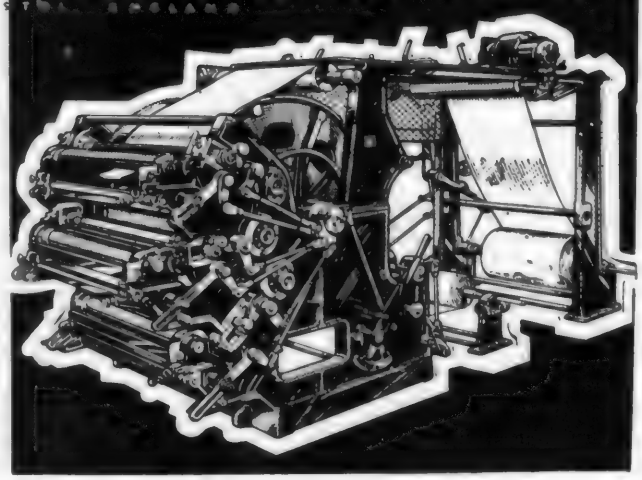

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for foodstuffs

Have you had a copy of our book **EDIBLE COLOURS ?** *If not, write for it at once. You will find it most useful and instructive.*

We manufacture a very wide range of colours especially for use in edible products. The purity of these colours is not accidental but definitely designed and scientifically controlled. These methods of production result in pure products giving clear bright solutions and natural shades in use.

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because, due to our vast international experience, we have been able to assist Customers to solve their most difficult problems concerning their varied productions. Included in our large range of machinery are:

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One of the most popular mixing devices consists of a shaft and propeller driven by an electric motor which may be clamped on to the side of a kettle. Such mixers are relatively cheap and may be used for many different services. MONEL is employed for both the shafts and propellers, partly because of its strength and partly because the equipment usually requires to be quickly cleaned between changeovers.

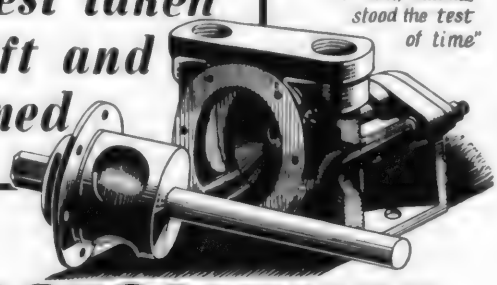
See Advertisement of

Henry Wiggin & Co., Ltd.

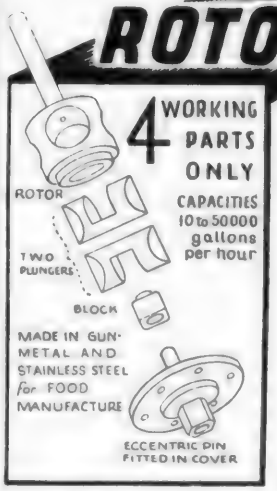
Page lxvii

Easiest taken adrift and cleaned

"The Pump that has stood the test of time"



ROTOPLUNGE PUMPS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ECCENTRIC PIN FITTED IN COVER

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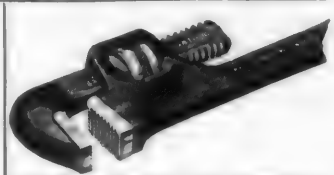
WALWORTH Service Bulletin

No. 12 VOL. II — DECEMBER, 1938

BLIND BUYING!

Ordering what you want for a "piping" job is one thing. Promise of delivery date is another. Having both executed satisfactorily is a problem many a contractor has come up against. Quality products are essential to your reputation. Time schedules must be kept.

Avoid blindfold buying — "Get what you want when you want it" from Walworth. Walworth's infinite variety of Tubes, Fittings, Valves, and Tools to install them are obtainable immediately from stock. Time and expense are avoided when you buy from one source.



The Walco Wrench has recently been improved by these new features:—

1★ *A renewable tooth section is let into the body, thereby extending the life of this part of the wrench indefinitely.*

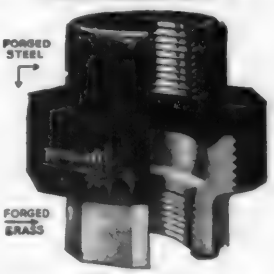
2★ *The inserted section is "cross-locked" into place to prevent movement in any direction, but can be easily removed for renewal when required.*

3 *The wrench is Parkerised and Cadmium Plated to protect it from rust.*

★ *14" and larger.*

All parts are forged from high carbon steel, heat treated all over for toughness and the teeth are hardened, which ensures that this new Walco Wrench will stand a lot of use and abuse.

Made by Walworth, originators of the Genuine Stillson Wrench.



Kewanee
FORGED UNIONS
are designed for hard work

No other union has all these desirable features:—Forged Steel to Forged Brass. Brass to iron contacts at seat and ring connections—No Corrosion. No inserted parts—only one seating to make and keep tight. Heavy construction—Good for 250 lbs. and more. Moderate price—anyone can afford to use them.

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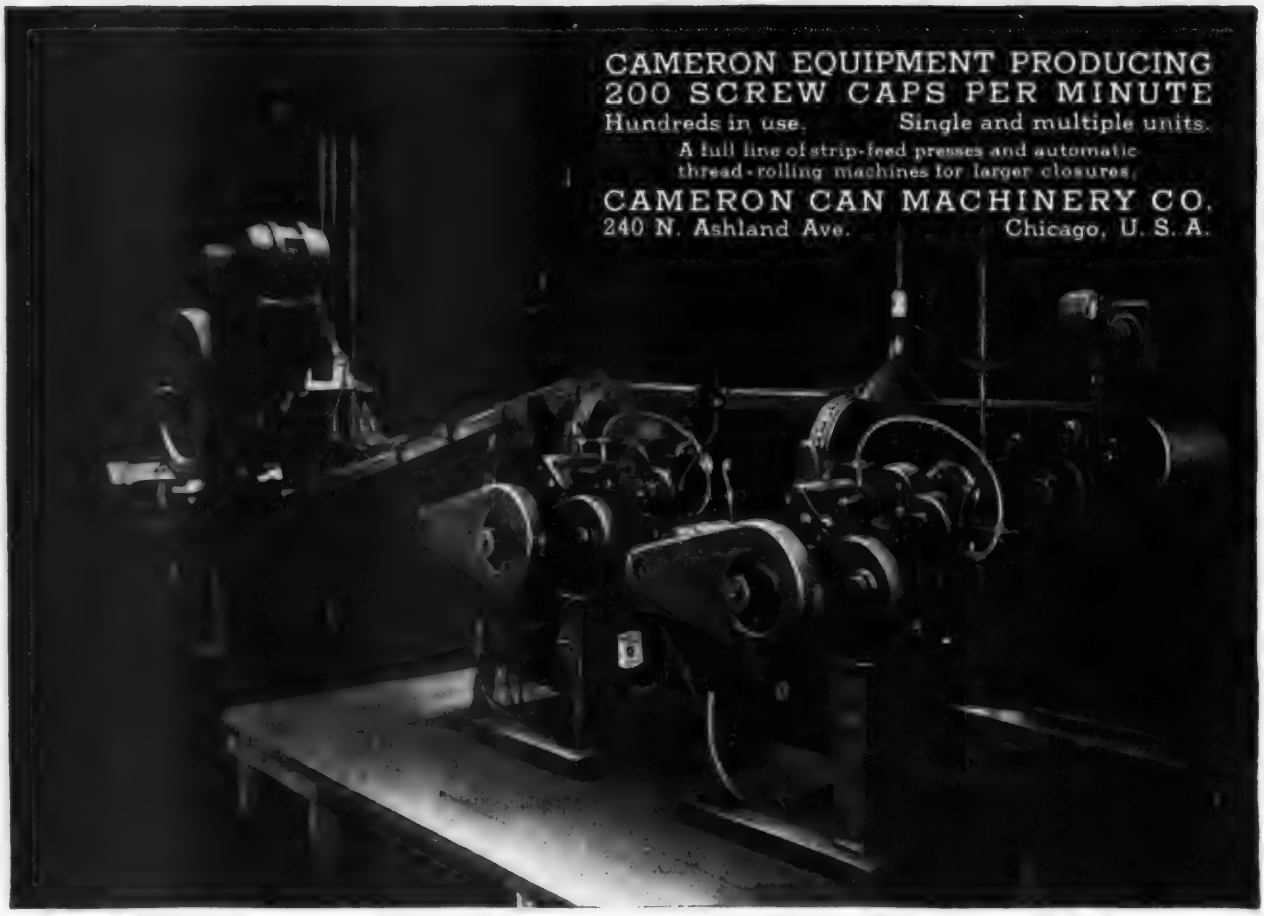
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Hundreds in use. Single and multiple units.
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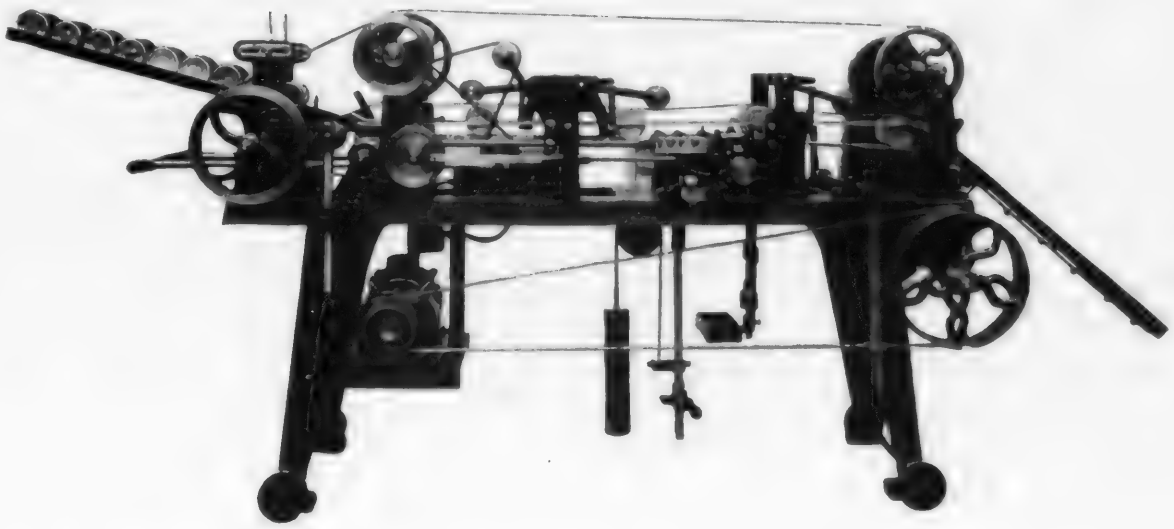
"BETH" BRITISH

LABELLING MACHINES



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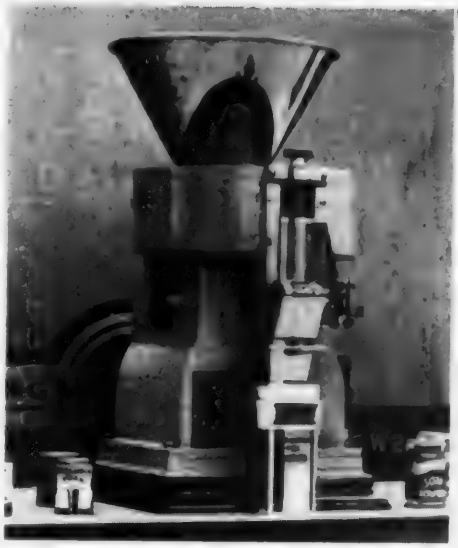
Telephone: Darlaston 130 (P.B.X.)



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MINCER *for Meat Pastes*

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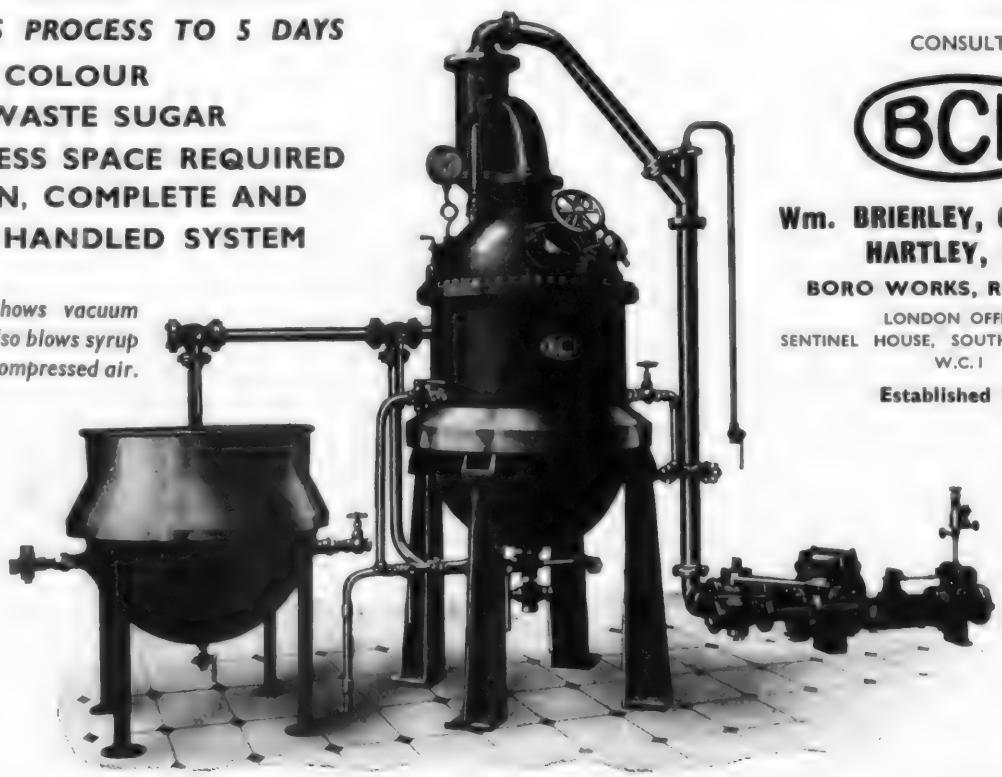

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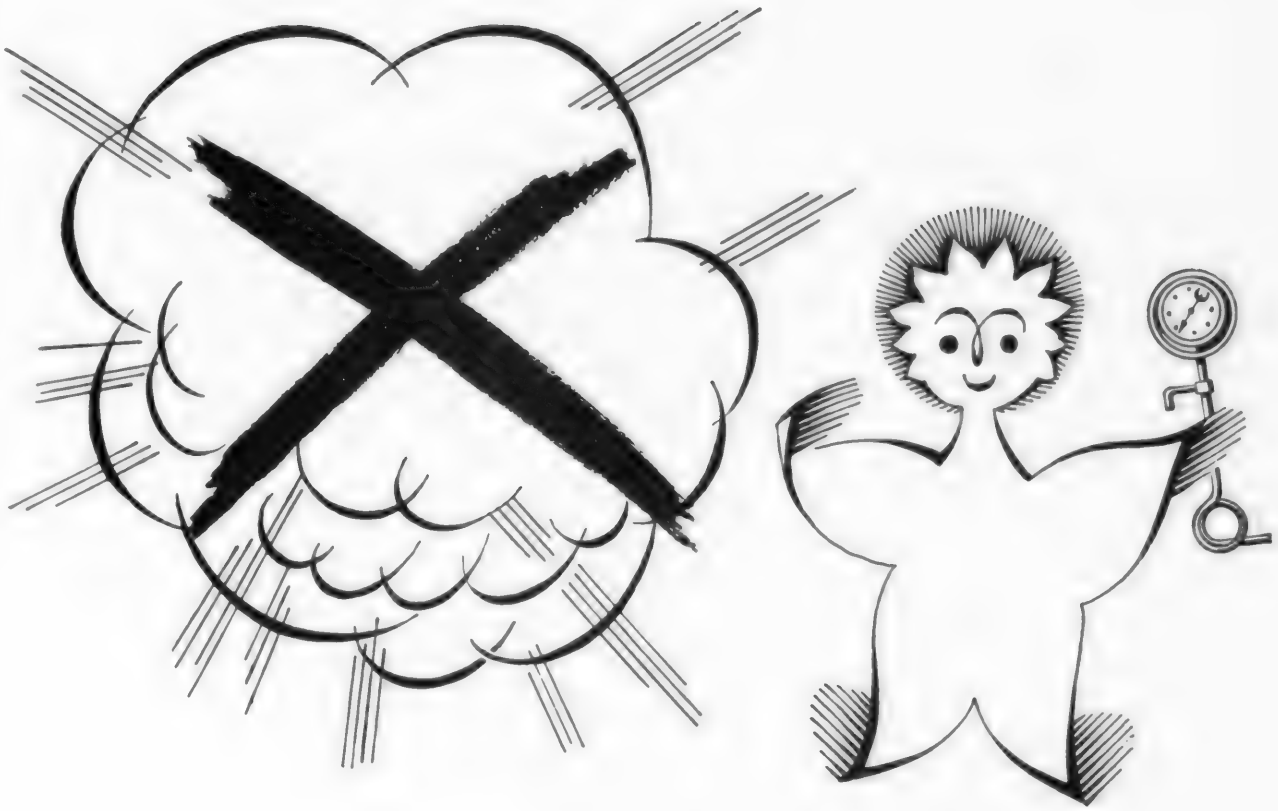

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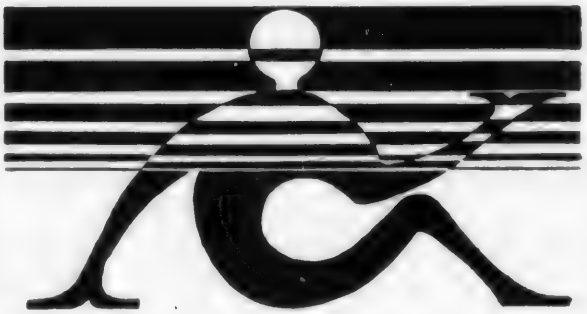

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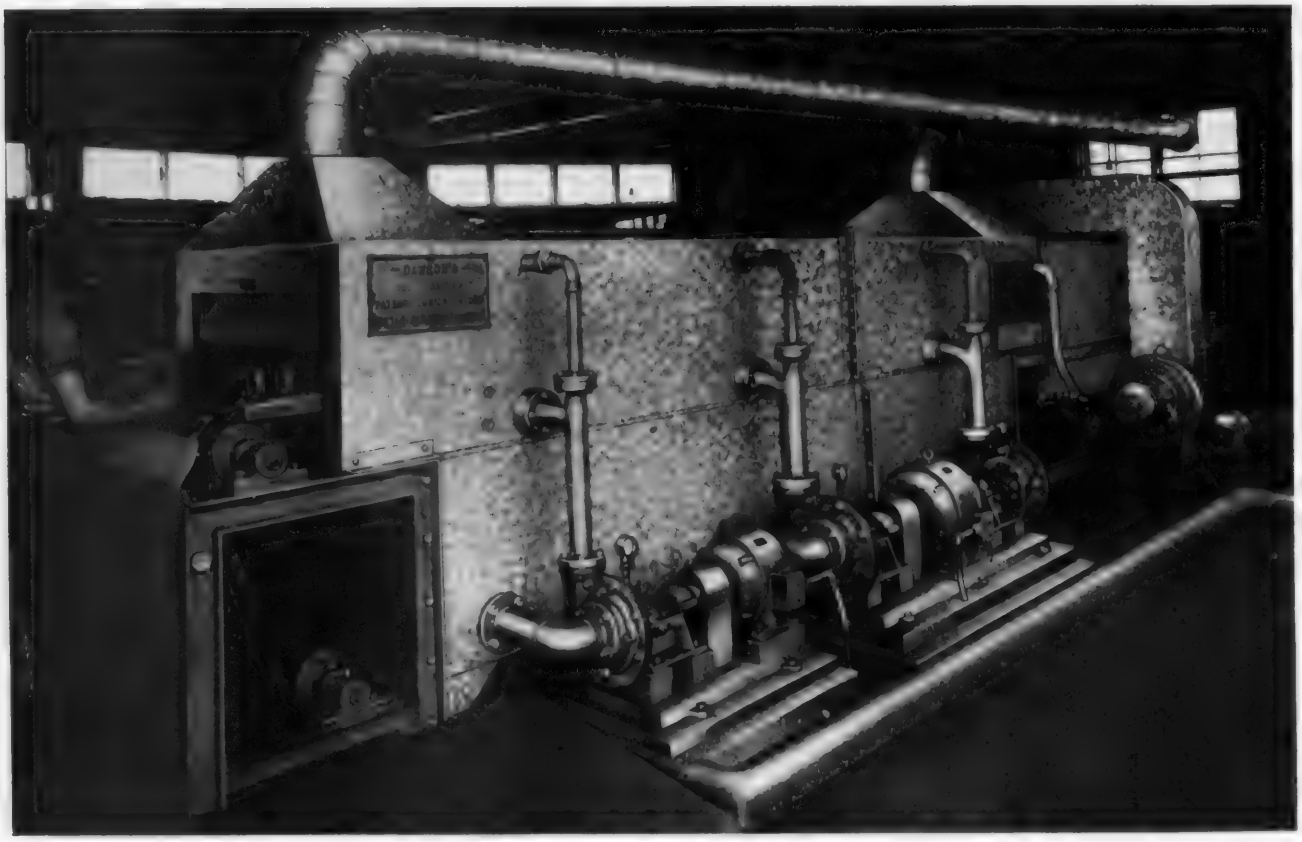

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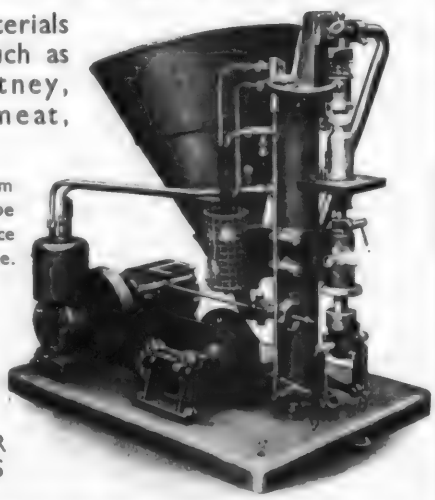

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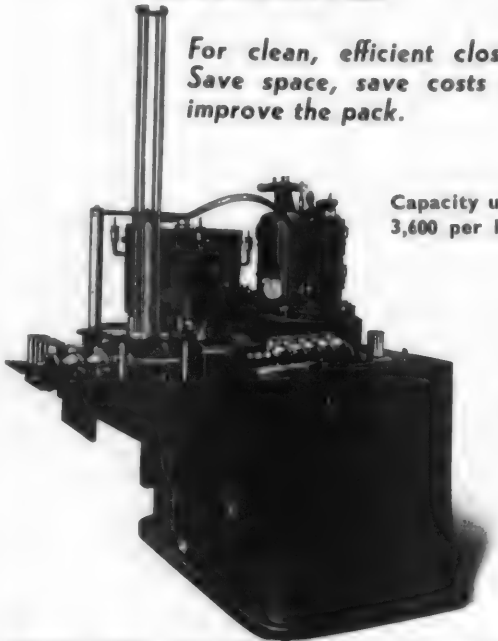

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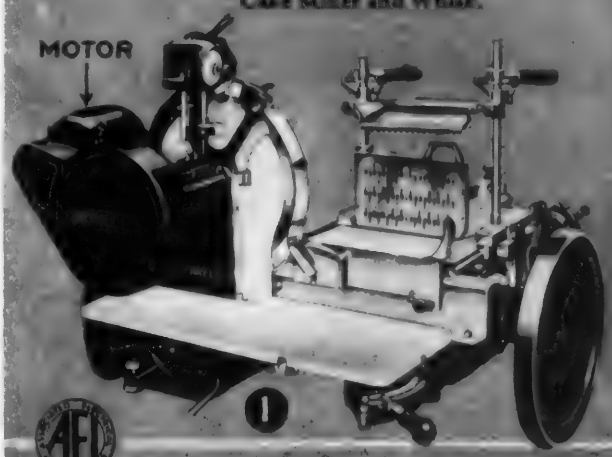

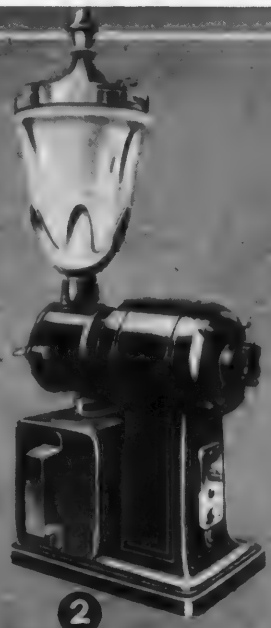

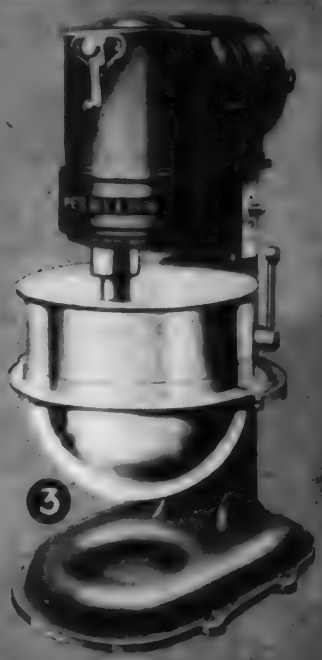

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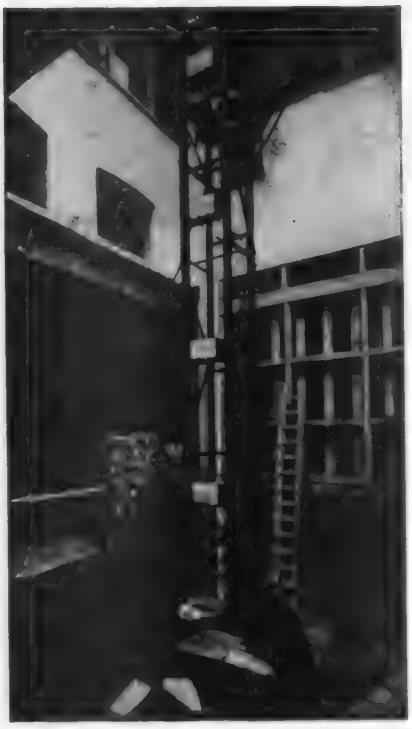

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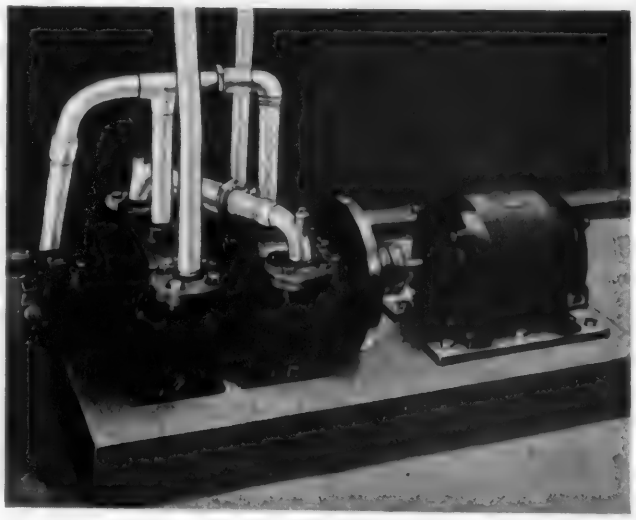

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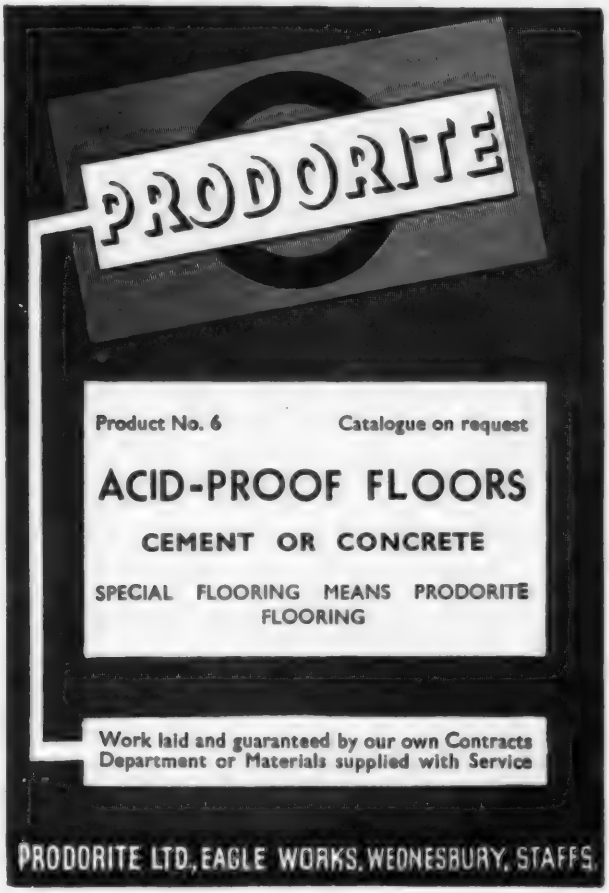
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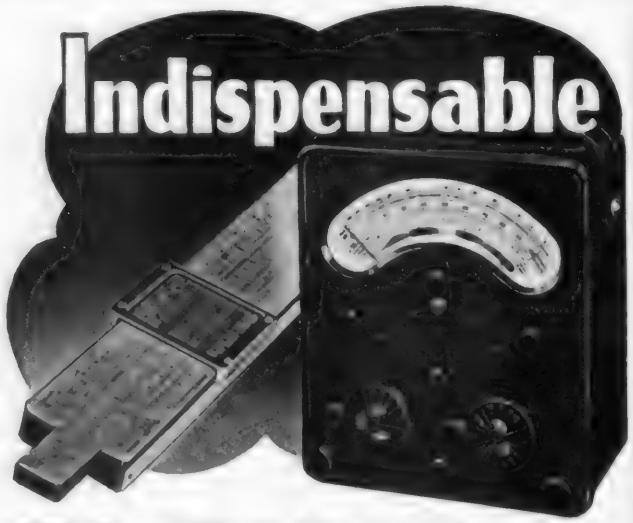

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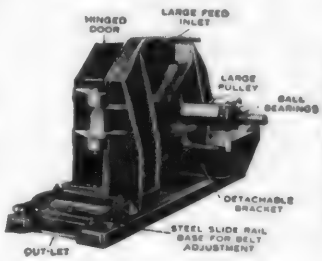

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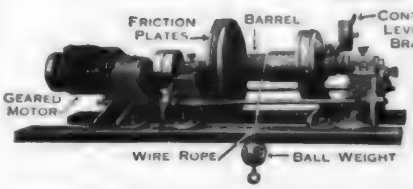

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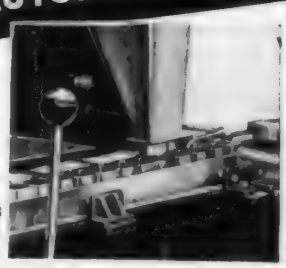

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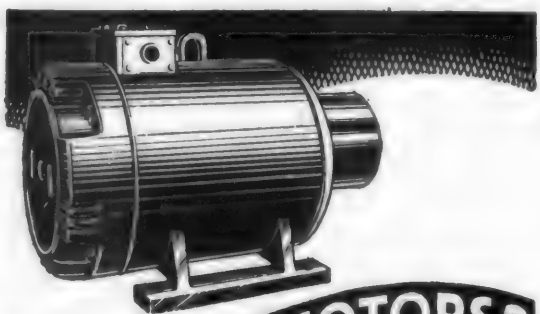

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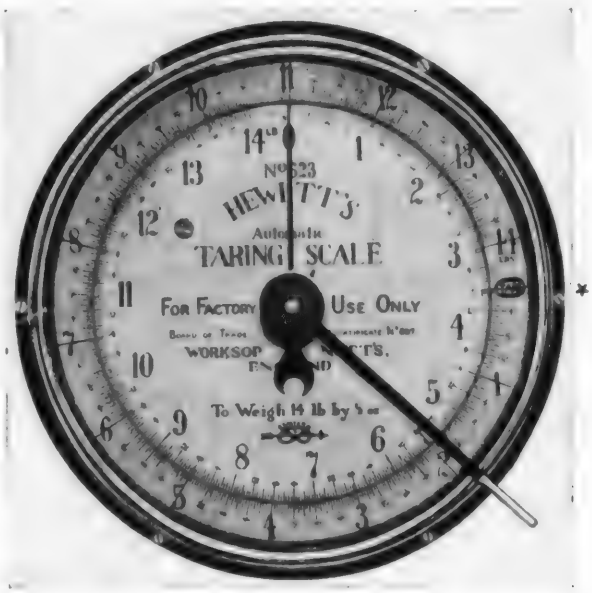

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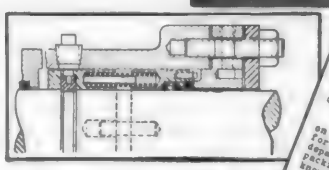
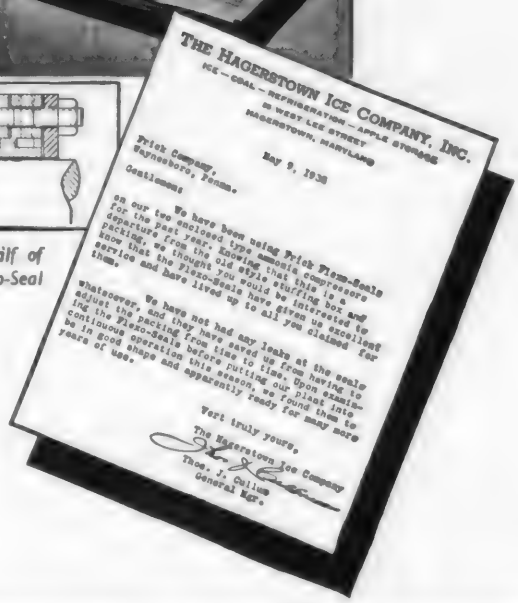


Section through half of Frick Patented Flexo-Seal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Page lxvii

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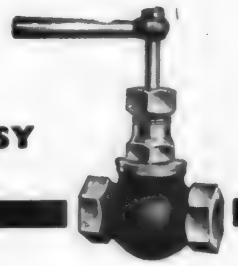

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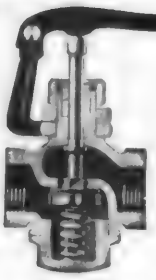

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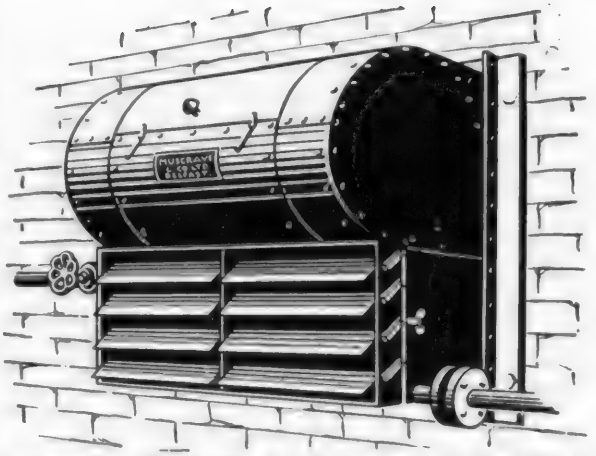

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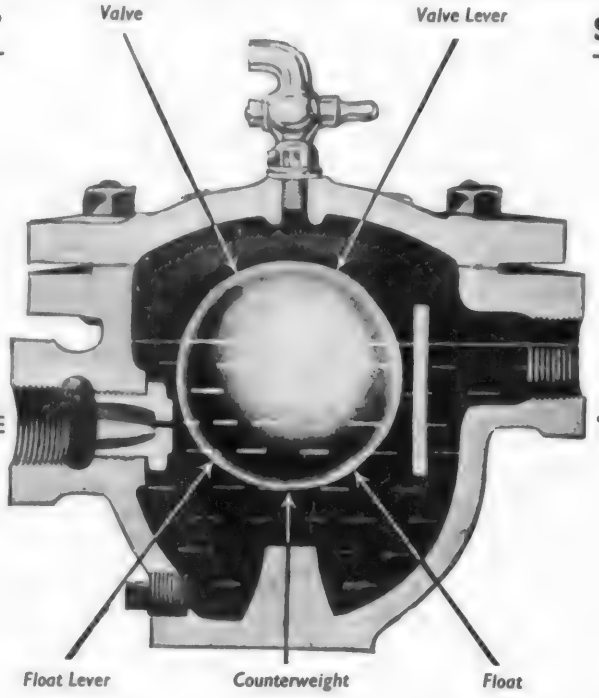

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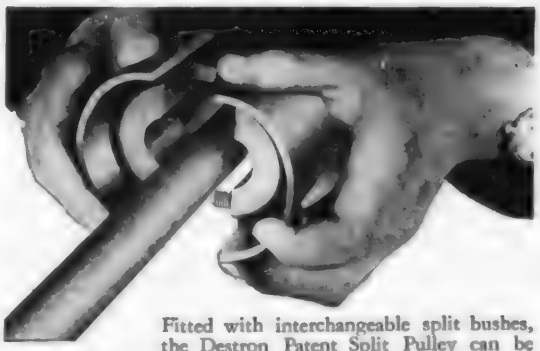

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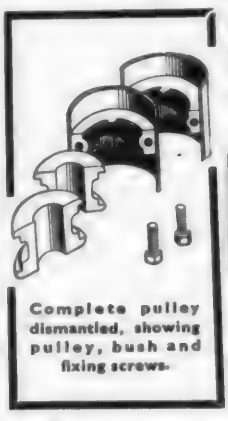

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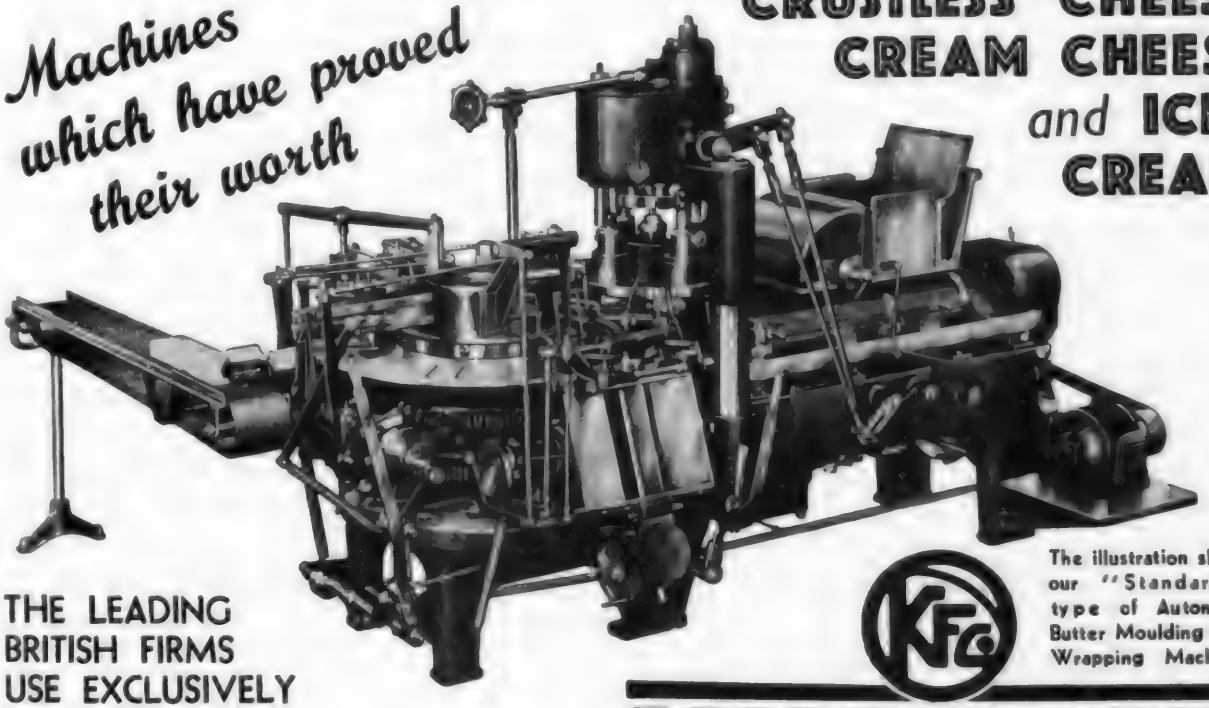

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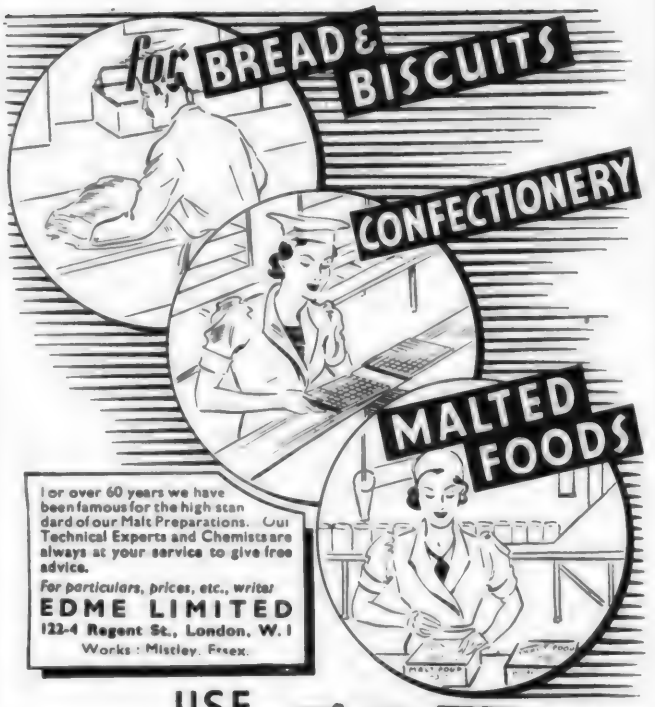
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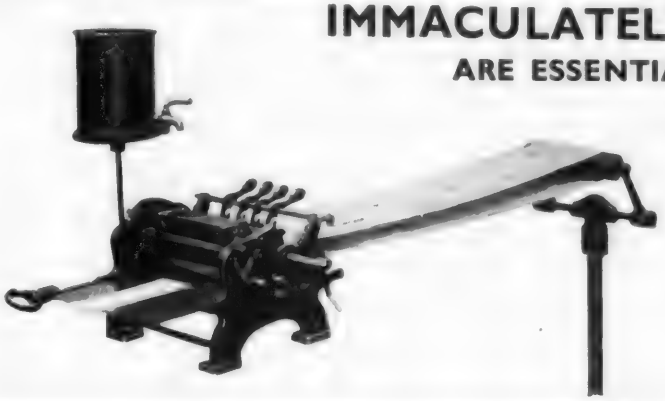

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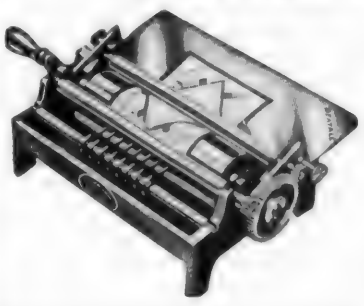

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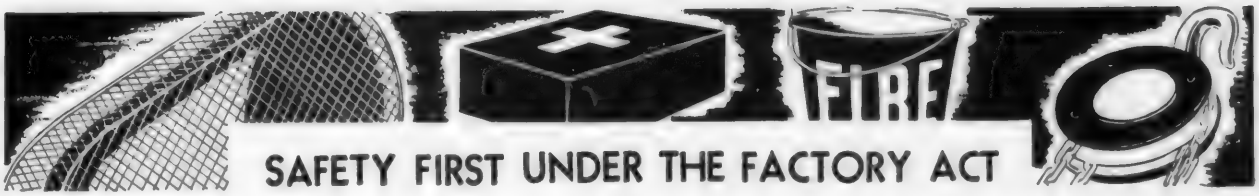

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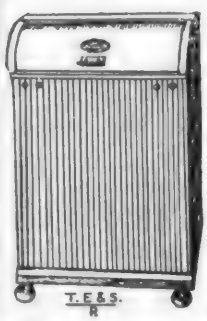

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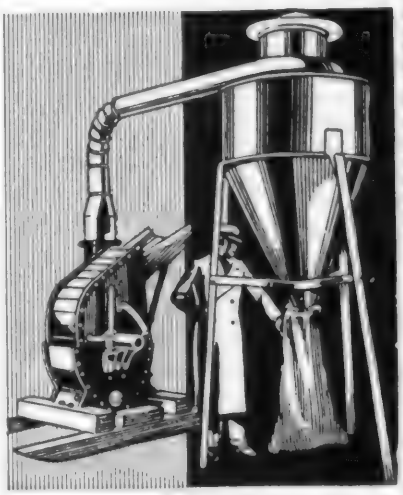

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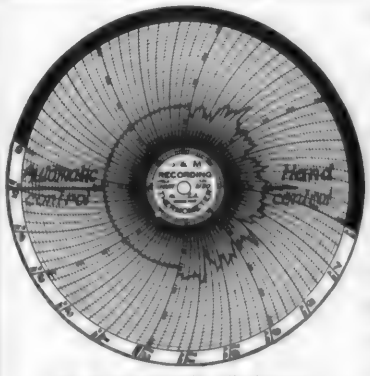

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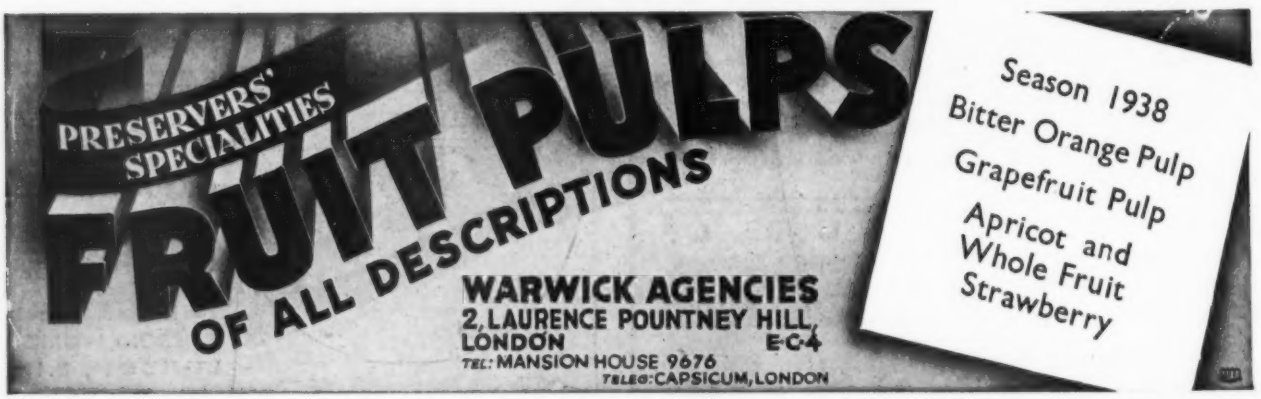

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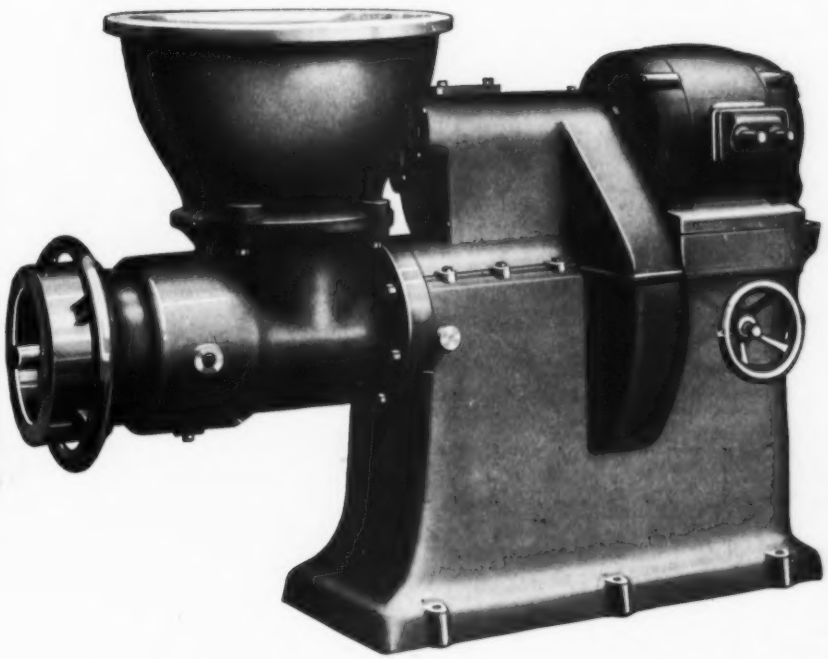

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